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EDITED BY

WM. SAUNDERS,

LONDON, ONTARIO

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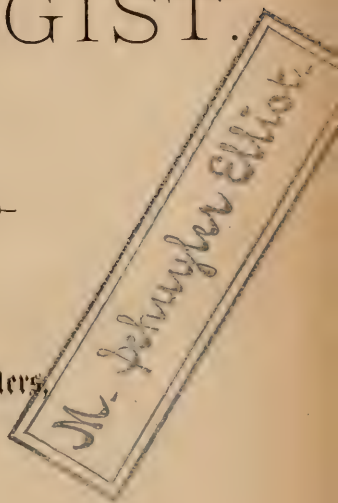
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No. 1

THE NATURAL HISTORY OF COSSUS CENTERENSIS.

BY JAMES S. BAILEY, A. M., M. D., ALBANY, N. Y.

Although *Cossus centerensis* has only recently been discovered, it must have existed for many years in the vicinity of Center, N. Y., its present home. More than twelve years ago, while riding in a Central R. R. coach, I noticed certain species of Poplar, the central shoot of which had perished from causes then unknown; later, while on an Entomological tour near the same place, I found a group of the *Populus tremuloides* which were similarly affected, as were also many other trees of the same species in the vicinity.

On closer inspection many perforations were found in the trunks of these trees, some of which were of recent origin, but nothing then was discovered to explain the cause and consequent unhealthy condition of this species of timber; several times each year afterwards this group of Poplars was examined, but nothing definite was learned until during the month of July, 1876, when a brittle pupa-case was found protruding from one of these openings. This gave a clue which revealed the true nature of the destroyer of this woody growth. On the 10th of June, 1877, a fresh pupa-case was discovered, removed and examined, but the *Cossus* could not be found, although probably resting upon the tree at that time.

It now remained for the youthful and keen eyesight of my son, Theodore P. Bailey, to discover the imago. The facts as related were communicated to stimulate him to vigilance, and the trees were examined daily, every foot of them being closely scrutinized. June 14th of the same year he found a fresh pupa-case, and but a short distance from it a male *Cossus*, which had apparently just emerged. This insect was given to Mr. Lintner, who subsequently described it in the CANADIAN ENTOMOLOGIST. I am now enabled to add a few facts in reference to the natural history of this borer, to give a description of its earlier stages

which have hitherto been unrecorded, and have also added a more minute description of this interesting moth. The accompanying lithograph represents the insect in its different stages, life size. This season (1878) beautiful specimens of both sexes were obtained during the month of June, from which our illustrations were made by Paul Riemann, a naturalist and artist. During 1877 the majority of examples obtained were females; during 1878 the reverse was the case, as males largely predominated.

It was ascertained that the time for the *Cossus* to emerge was from dark to early morning, or between the time of the setting and rising of the sun. Every day the empty cases were removed, and by counting them it was known how many to expect to find, which aided the collector much.

As might be expected from the aborted tongue, this *Cossus* is not attracted by sugar. The trunks of the trees from which they emerged, as well as neighboring trees, were sugared extensively during the time of their appearance, but not one came to taste the bait. During this process, in examining the sugared patches, the light from the bulls-eye lantern was thrown repeatedly upon the surface of the Poplar trees, and several were observed at different times in the act of emerging.

Just before the final transformation the pupa renews its efforts and pushes itself through the thin bark that has been allowed to remain by the larva. It pushes itself through the opening as far as the base of the abdomen, when, after a while, the exposed pupal skin becomes dry and splits, and the moth escapes, climbing up the bark of the tree, shaking out its wings until developed. The moths usually select the end of a dead and broken limb or protuberance of the roughened bark to rest upon, which their color so closely resembles that it is exceedingly difficult to discover their whereabouts.

The empty pupa skins remain at the entrance of the tunnel. The moth itself at first is rather sluggish, and can be captured readily on the bark of the tree in which it has passed its immature state. The moth is very liable to "grease," consequently it is advisable to let it thoroughly dry before capturing and pinning. The cavity of the abdomen should be stuffed, and a few drops of benzole previously put in the cavity or placed upon the material used as stuffing.

The chrysalids vary much in size, some of which are infested by an ichneumon fly, which preys on the caterpillar. A pupa was observed endeavoring to make its way to the surface of the bark, but seemingly unable

to extricate itself, when assistance was rendered by enlarging the orifice. It was laid in a paper box for hatching; a few days afterwards many minute ichneumons were observed resting upon the wall near the box; on examination they were found to be escaping through minute holes in the pupa, which would barely admit a No. 3 Entomological pin. Fifteen of these perforations were counted in this pupa. I presume that the larva of the *Cossus* is pursued in its burrows by the parent parasite. If so, it is curious that the *Cossus* pupa is not killed by the parasites until it has worked itself up to the mouth of the tunnel, thus allowing the ichneumon flies to escape outside.

October 14th, we visited the trees which were known to be inhabited by the *Cossus*, for the purpose of obtaining caterpillars in the different stages of growth. A section of a tree measuring nearly four feet in length was taken, and from it six caterpillars were secured, two of which were occupying pupal cells preparatory to transformation. Judging from the difference in the development of the caterpillars taken at this time, it would seem as if it would require at least two years for their maturity.

While thus far the Center locality has proved to be the chief home of this *Cossus*, it will undoubtedly be found elsewhere wherever the *Populus tremuloides* is found. Several pupa cases of this species have been found in the corporate limits of Albany. Usually trees of less than one foot in diameter are attacked, although in one instance a pupa case was found in a tree measuring sixteen inches in diameter.

The larva, taken October 14th from its burrows, is 45 mil. in length, of a pale flesh color. It is a little broader anteriorly. The prothoracic segment is blackish brown above, the dark color edged with a dirty orange shading. The head is mahogany brown, shining, slightly roughened. The mandibles are black, with three strong teeth. The surface of the head gives rise here and there to single scattered hairs. The antennæ are three-jointed; the second joint gives rise to a single long hair. The 7th, 8th, 9th and 10th abdominal segments are provided with false feet. The segments are marked with a lateral row of brown dots above the reddish stigmata, and there is a row of similar dots, two to a segment, on each side of the dorsal line. These dots give rise to single pale hairs. The larva moves with freedom either backward or forward. The burrows which it excavates are about 15 millimetres in width, and terminate in the pupating cell, which is about 40 mil. in length, smooth; the extremity towards the opening is closed by a wad of finer and then coarser filings

of the wood. The coarser splinters are *not* detached entirely from the wood, but are split up by the larva all around the top of the cell, and project like bristles, appearing somewhat as those wooden toy-trees which are made for children, and which are formed by shaving down the wood and leaving the shavings still adhering by one end. These splinters make a firm wad. Against them are piled a quantity of finer chips or thin filings, which are loose, but pressed together.

The cell is about 40 mil. from the outer bark of the tree, and the chrysalis makes its way to the air through the burrow by means of its teeth on the segments and the spinose process on the front, by which it forces itself, by stretching and contracting the abdomen, through the wood scrapings which close the cell, until it comes to the end. We have noticed a fine thread of silk proceeding from the spinneret of the larva, although in the puparium we have found no silk whatever. The puparium seems to have been formed by wedging first coarser, and then finer strips of the wood together, and seems to be merely a more carefully and smoothly finished enlargement of the original burrow.

A specimen of the pupa which I have examined is about 30 mil. in length, narrow, brownish black, shining, rugose. The clypeus presents a strong broad spinous process, supported at base by lateral projections. On the underside it descends into a wide sulcation, terminating in a broad projection. The caputal appendages are visible, and here and there arise isolated hairs as in the previous stage. The abdominal segments are provided with teeth over the dorsum, decreasing in size to the stigmatal line. The anal segment is provided with two unequal sized terminal teeth on each side of the vent.

The moth seems to belong to the genus *Cossus* Fabr., and not to be congeneric with *Xystus robiniae*. The head is short, eyes naked, labial palpi small, appressed, scaled. The thorax is thickly scaled, the scales gathered into a ridge behind, and is squarer in front than in *Xystus*, not so elongate, or so elevated dorsally. The male antennæ are bipectinate, the lamellæ short, rather broad and ciliate. The female antennæ are serrated. It is allied to the European *Cossus terrebra*, while a larger insect. It differs from *C. querciperda* by the absence of any yellow on the male hind wings, and by its darker color and closer reticulations.

In color this species is black and gray; the edges of the thorax and collar are shaded with gray—more noticeable on some specimens than others. The primaries are covered with black reticulations, which are not

always identical in their minor details in different specimens, nor sometimes on both wings in the same specimen. Beyond the cell there is a transverse continuous line, broader than the rest and outwardly bent over median nervules. The ground color is blackish over nearly two-thirds of the primaries from the base, and outwardly gray. Hind wings rounded in both sexes, with blackish hairs at base, pale and sub-pellucid, with short gray fringe, before which there is a narrow blackish edging. The abdomen is blackish. The males are smaller than the females. The smallest male expands about 40, the largest female over 60 millimetres.

A female, after being captured and pinned, deposited three eggs, which were clothed with scales of the same color as those of its abdomen. The females possess a long ovipositor, with which they place their eggs securely in the deep crevices of the bark of the same species of tree from which they emerge. In due time the worms are hatched, and although very small, are soon able to bore into the tree, never apparently ceasing to eat and extending their tunnels through solid wood, first in the alburnum and then through the heart, their burrows increasing in size as the larva increases, until the latter are completely grown. In consequence of the innumerable tunnels cut in feeding many trees are destroyed.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KY.

LAVERNA.

L. Murtfeldtella Cham.

Miss Murtfeldt favors me with the following notes upon the larva of this species: "It feeds in the flowers of the *Oenotheras* both wild and cultivated, and is especially destructive to *O. Missouriensis*, which is now extensively cultivated. The eggs are laid singly on the sticky surface of the calyx, and the larvæ, as soon as hatched, make their way to the centre of the bud and feed upon the petals and stamens. The full-grown larva is $\frac{1}{4}$ inch in length, cylindrical, tapering slightly posteriorly and anteriorly.

When young it is of a dull brownish-green color, gradually assuming a reddish tint, until at maturity the dorsum and sides are of a deep dull pink arranged in wavy shaded stripes, which are most intense on the subdorsal spaces. Head oblique, round, pale glossy grayish-brown, with dark brown mandibles and the triangular face outlined with the same color. Cervical collar entirely covering top of 1st segment of glossy dark grayish-brown, marked on the dorsum with a narrow but distinct longitudinal line of white. Anal plate brown and horny. Legs and prolegs well developed. Pupates in a dense, tough, yellowish-white cocoon on the surface of the ground. Moths issue in about ten days. There are at least two distinct broods in a season, the second of which hibernates in cocoon."

Miss Murtfeldt adds: "The *Enothera*s ought to be dear to the Entomologist on account of the numerous and beautiful insects which they foster. I have already reared from them seven or eight distinct species and am sure that there are still others."

One of these is *L. † enotheræella* Cham., which, however, is no doubt the same species placed by Zeller provisionally in *Phyllocnistis* as *P. magnatella*. As stated elsewhere, this, though not a true *Laverna*, is nearer to that genus than to *Phyllocnistis*.

L. enotheræsemenella Cham. is another of the *Enothera*-feeding species.

In Colorado I met with a larva believed to be that of a *Laverna* mining in the leaves of a species of *Enothera*, but I did not succeed in rearing it.

Including *enotheræella*, there are thus five species of *Laverna* which are known to feed on *Enothera* in this country; and it is not at all improbable that other species will also be found to feed upon this genus of plants. The genus *Epilobium* is nearly allied to *Enothera*, and in Europe eleven of the seventeen known species feed upon *Epilobium*,* one of the eleven also feeding on an allied plant (*Ciræa luteliana*).

Since the original description of *Murtfeldtella* was prepared, I have also taken it in Kentucky. The dark lines and specks mentioned in the description are seen in the fresh specimens to be mostly composed of raised scales, and so likewise are some of the white marks; and there are also some raised scales on the thorax. Its nearest known congener seems to be *L. decorella* Stainton. A comparison of a good series of specimens satisfies me that *L. albocapitella* Cham. and *L. grissella* Cham. are merely variations of *L. Murtfeldtella*.

L. cephalanthiella Cham.

The description of this species, *ante v. 3, p. 221*, is very unsatisfactory, but it is next to impossible to describe satisfactorily these small species of many colors irregularly mixed and blended, and varying with every change of the light, especially when, as in this instance, there is considerable range of variation within the limits of the species. No difficulty will, however, be experienced in recognizing bred specimens, and no species has yet been discovered in this country which approaches it at all closely; and until some such species is discovered, the following general description of the fore wings will perhaps assist one in recognizing the species more than a more detailed one:

Varying in different specimens from ochreous dusted and overlaid with brownish gray, to brownish gray streaked or marbled with ochreous; that is, the proportion of the two colors varies greatly in different specimens, and even appears to vary in the same specimen according to the direction of the light and the power of the lens used in observing it. The grayish or brownish-gray parts of the wing have metallic reflections, and in some views it is a very pretty and in others a very plain insect; there is a large blackish tuft on the dorsal margin about the middle, and usually the portion of the disc above and behind this tuft is distinctly ochreous, containing a longitudinal blackish short streak; there is also a similar tuft about the anal angle; there are two costal blackish streaks behind the middle, and a third passes entirely around the apex; the apical half (and a little more) of the wing is more ochreous than the basal half, and the part of the wing *behind* the second tuft and *before* the second blackish costal streak is distinctly ochreous, with or containing a short blackish longitudinal dash (like that in the ochreous patch above the first tuft above mentioned). The ochreous of the wings has a reddish hue; the ciliæ are pale ochreous tipped with blackish and with a blackish hinder marginal line just before the tips. Apex of the fore wings obtuse.

In the statement, *loc. cit.*, that the mine and larvæ resemble those of *Aspidisca*, the word "larva" is a *lapsus pennaë*, though it is correct as to the mine. The mine, however, is more like that of an *Antispila* than of an *Aspidisca*; that is, the mine of the well-grown larva—its last mine—which is always, so far as I have seen them, (and I have seen a great many) near the edge of the leaf; but the young larva, before it makes that mine, usually makes two or three short linear mines beginning at the midrib. The imago does not resemble at all closely any species known

to me, but the larva resembles that of the European *L. substrigella*, as figured in Nat. Hist. Tin, xvi. The head is pale sordid brownish, upper portion of next segment a very little darker, with a crimson spot on each side of the dusky portion and another just above the feet. The next segment has the crimson spots larger and more diffuse, and on top of it begins a wide crimson line which extends along the dorsum of all the segments to the anal; the remaining segments, except the last two, have each three crimson spots on each side of the median crimson line, instead of two, as in those immediately following the head; each of the last two segments has a transverse crimson line.

L. obscurusella Cham.

The form of the palpi, the tufts along the dorsal margin of the fore wings, and the neuration of the wings in this species resemble those of *Chauliodus* Lint., and it perhaps belongs as properly in that genus as in *Laverna*—if, indeed, any well marked distinction exists between the genera.

L. ? ignobilisella Cham.

As stated in the CAN. ENT., v. 7, p. 51, the imperfect description of this species was unintentionally published, and the mistake was discovered too late to correct it. Since then, having received other material, I have been enabled to give a more correct account of the species. The ornamentation resembles closely that of *L. ? Coloradella* Cham., and they may prove to be varieties of the same species. The form of the head seems to me to differ, however, the head and face in the Texan specimens being wider than in those from Colorado in proportion to their length, and there is, so far as I am able to compare them with the material before me, a decided difference in ornamentation, though the resemblance is strong.

The wings are not tufted and the second palpal joint is but little enlarged towards its apex. Head, antennæ and basal joint of palpi silvery white, stalk of antennæ yellowish fuscous. Thorax and fore wings silvery white, with an ochreous costal spot about the basal fourth of the wing length, extended to the fold, sometimes interrupted so as to form two spots, one on the costa and one on the fold, and the costal margin to the base more or less stained with fuscous; just behind the middle the wing is crossed by an ochreous band, and the wing at its tip and along the base of the dorsal ciliæ is dusted and suffused with ochreous. Ciliæ white, hind wings and legs whitish. *Al. ex.* nearly $\frac{1}{2}$ inch.

PERIMEDE.

P. unomaculella.

Ithome unomaculella Cham., ante v. 7, p. 94.

This species is too near *P. erransella* Cham. to be separated generically from it. The neururation differs as follows: In the fore wings the median subdivides into four branches instead of into five; there are likewise no tufts on the wings and the palpi are perhaps a little shorter. There are no other structural differences, and they resemble each other closely also in ornamentation; *unomaculella* is, however, decidedly the smallest, having an *alar ex.* of only $3\frac{1}{2}$ lines.* Perfectly fresh specimens of both are deep shining brown, but when a little worn they become dingy. Specimens of *unomaculella* differ as to the amount of white and dark brown on the terminal joint of the palpi; the antennæ are faintly and the tarsi distinctly annulate with whitish. Its position in repose is unknown to me, but *P. erransella* lays the hind legs along the abdomen and rests on the other two pair, with the face not quite touching the surface on which it reposes, and the hinder part of the body and wings elevated so that it looks as if it stood upon its head.

Ææa ostryæella and *Chrysopeleia purpuriella*.

I observe that at p. 72, v. 4, ante, the later generic name is misspelled *Chysopeleia*. These two species can not be separated generically and are even very closely allied species. The antennæ of *purpuriella* are, *loc. cit.*, described as "sub-pectinate." I meant to write serrated, but those of *ostryæella* are more distinctly so; the palpi in the living insect are recurved in both. *Ææa ostryæella*, like all the *Ostrya*-feeding species, is very difficult to rear, because the leaves dry or mould so quickly, so that out of hundreds of gathered mines I have only succeeded in rearing some eight or ten specimens—about equal numbers of both sexes. The generic and specific diagnoses were prepared from three males. The female differs decidedly from the male, and very closely resembles the male of *purpuriella*. The male of *ostryæella* is lighter colored and more grayish, with less of the purple lustre than the female, and in the latter pale grayish fasciæ are absent. Both are of the same size. *Purpuriella* is somewhat larger than *ostryæella*, and though not so strongly tinged with purple as the female of *ostryæella*, it is decidedly darker. Its food plant is unknown, and certainly its habits of life must differ from those of

ostryæella, for no mine similar to that of the latter is found in this vicinity. The male is nearer in ornamentation to the female *ostryæella* than to the male, being darker, more purplish and lacking the fasciæ. There are slight differences in neuration between the two species, but not greater than are found between different species of *Laverna*, or even *Elachista*, which is perhaps nearer to these species than *Laverna*. But the different phraseology used in the diagnosis of the two genera may perhaps indicate greater differences of neuration than actually exist; though "discal cell long, narrow and closed by an oblique discal vein," which "sends a vein to the hinder margin from a point near the median vein," which (the median) "passes straight to the hind margin," sending "just before the discal vein a branch to the hind margin," (*Chrysospeleia*) is pretty much the same as discal cell narrow and rather acutely closed; and "the median divides into three branches from the apical part of the cell"—(*Ææa*) the difference being that the oblique vein which closes the cell is in the one case considered as the discal vein, and in the other as the end of the median. In both species the head is not only short and depressed, but is almost acutely angled in front. The position and number of the tufts is nearly the same in both species, and is not very accurately indicated by the position of the dots at p. 73, v. 4. The two opposite costal dots should be nearer together, and in *ostryæella* the inner one is a little in advance of the outer one; while in *purpuriella* the first and last are a little further from the two central ones than in *ostryæella*. *Ostryæella* also has two or three minute tufts in the apical part of the wing, which are wanting in the other species. In *purpuriella* there is, *loc. cit.*, said to be an "indistinct confused yellowish fascia about the apical fourth," but in some specimens this is simply represented by a pale ochreous dot before the dorsal ciliæ. Both species should be referred to *Ææa*.

DESCRIPTION OF A NEW SPECIES OF ANISOTA.

BY J. A. LINTNER, N. Y. STATE MUSEUM NAT. HIST., ALBANY.

Anisota bisecta, nov. sp.

♀. Head sunken; head and collar tawny. Antennæ short, simple, the joints showing as distinct rings. Thorax robust, globose, elevated in front, and projected over the head more than in *A. bicolor* or in *A. Heilig-*

brodti. Shoulder-covers narrowly bordered above with brown. Abdomen short, not extending beyond the hind wings, concolorous with them.

Primaries rounded, full, much as in *A. bicolor*, but more rounded on the outer margin; pale ochraceous, sprinkled with brown irrorations which are more numerous costally and outside of the transverse line; the latter brown, sharply defined, commencing just before the apex (nearer to it than in *A. bicolor*) and running straight to the inner margin at its middle, or a little nearer to the base. Outside of this transverse line the wing is somewhat darker. Inner margin of wing bordered with brown of the shade of the tr. line, becoming stronger until lost in the long basilar hairs. An indistinct sub-basilar line is indicated by some confluent brown spots, in form and direction similar to that of *A. bicolor*. Cilia interspersed with some brown scales.

Secondaries rounded at the angles and excised costally, more than in *A. bicolor*; without spots, and with no median band; of a paler ochraceous than the primaries, more yellowish toward the outer margin; basilar region bearing some dull reddish long hairs from below the cell to the fold near the inner margin, upon which they attain their greatest extension. Cilia concolorous with the basal portion of the wing.

Beneath, wings of a duller ochraceous. Primaries with the transverse line indicated at the apex by a clustering of the brown dots, and beyond, showing from the upper surface; the brown dots are confined to the costa, the apical and the outer portions of the wing; a diffused brown discal spot.

Secondaries darker ochraceous than above. Costa and costal region thickly sprinkled with dark brown dots. From near the apex, a brown shade curves downward and then inward, losing itself opposite the cell; beyond this to the outer margin the wing is darker ochraceous than elsewhere. No discal spot.

Abdomen beneath concolorous with the outer margin of the secondaries. Tibiæ and tarsi of the anterior and middle legs, lead colored.

Expanse of wings, 3.12 inches; length of body, 0.94 inch.

Habitat, Racine, Wisconsin. One female, captured by, and in the collection of, P. R. Hoy, M. D., of Racine.

This species can at once be separated from all other known American species, by its pale ochraceous color, and the very distinct and oblique transverse band dividing the wing into two nearly equal parts.

It is closely allied, judging from the description and figure in *Trans. Amer. Ent. Soc.*, vol. i., p. 11, pl. i, fig. 2, to the Mexican species *Adelcephala quadrilineata* Gr.-Rob., in the shape of its wings and thorax, the sharply defined, straight and very oblique transverse band, the absence of a median band on the secondaries, and the leaden coloration of the tibiæ and tarsi. The more prominent points of difference are, a more distinct sub-basilar band and the transverse band farther removed from the apex on the primaries, and the more extended reddish area of the secondaries in *A. quadrilineata*.

A. bisecta, in all probability, occurs also in Texas. I am informed by Mr. O. von Meske that he has carefully examined an example which had been received from Mr. Boll, of Texas, which he has no hesitation in regarding as the ♂ of the above described ♀. From a very recent inspection of the specimen, he is able to recall its more acute primaries, a deeper yellow color, the transverse line of the same course but stronger, the brown bordering of the inner margin, and a deeper red of the secondaries.

ON CERTAIN HYMENOPTERA.

BY W. H. PATTON, WATERBURY, CONN.

PREDACEOUS SAWFLIES.

On two occasions I have observed *Allantus basilaris* (Say) Nort. ♀ devouring another insect; in one instance the larva of a *Chrysopa*, in the other a small flower beetle of the genus *Phalacrus*. Although no such habit has been recorded previously in regard to any American species, it does not appear to be entirely without precedent among the European members of this family, for, according to Westwood, (Introd., ii., 109) "Various species, however, (*T. viridis*, *scalaris*, etc.) attack and devour living insects which frequent the same plants, as observed by St. Fargeau (Ann. Soc. Ent. France, 1834, p. 11) and Dahlbom (Prod. Hym. Scand., p. 38)." The choice of its prey made by the *Allantus* in the instances

observed does not warrant us in regarding the insect as beneficial, although the predaceous habits and some correlated peculiarities of structure tend to show that the imago may prove to be so. Upon what plant the larva feeds is unknown. The mandibles of *Allantus*, as of many other sawflies, are asymmetrical, the teeth on the right mandible being more acute than those on the left; but the resemblance which they bear to the mandibles of *Cicindela* is very striking and would of itself suggest a similarity of habits.

Of the restricted genus *Allantus* two species occur in the eastern United States, and, as they have not hitherto been clearly defined, I append their distinguishing characters:

1. ALLANTUS BASILARIS.

Tenthredo basilaris Say, Long's 2nd Ex., ii., 316 (1824).

A. basilaris Norton, Bost. Jour. N. H., vii., 240, 9 (1860).

" " Trans. Am. Ent. Soc., i., 361 (excl. var.
a ♂) (1867).

♂ ♀. Antennæ short, black; basal joint straw yellow. Markings on legs and thorax clear yellow.

♀. A large yellow spot on meso-pleura.

♂. Abdomen yellow, posterior tarsi black; pleura yellow, pectus pale.

2. ALLANTUS DUBIUS.

A. dubius Nort., Bost. Jour. N. H., vii., 241, 10, ♀ (1860).

" " Tr. A. E. S., i., 362, ♀ (1867).

A. basilaris, var. *a*, ♂ Nort., Proc. Ent. Soc. Phila., iii., 10, 18 (1864).

" " " Tr. A. E. S., i., 362 (1867).

♂ ♀. Antennæ longer; ferruginous basal joints generally paler. Markings on legs and often those on thorax piceous yellow.

♀. Meso-pleura black.

♂. Abdomen black, the second, third and fourth segments yellow; posterior tarsi piceous yellow; a small yellow spot on meso-pleura, pectus black.

♂ var. (one specimen). Antennæ black, a pale spot on pectus.

In *dubius* the wings are darker and the size slightly larger; the vertex is more coarsely punctured, not so highly polished, and often it is orna-

mented with piceous markings which are wanting in *basilaris*. There is generally less yellow on the legs, cheeks, collar, scutellum, basal plates and abdomen (*basilaris* ♀ sometimes has spots on the 1st, 2nd and 3rd segments) of *dubius* than of *basilaris*; but these characters vary in both species.

Both species occur in New England from the latter part of July to the latter part of August, *dubius* frequenting the low grounds, *basilaris* the hills.

A RARE XIPHIDRIA AND ITS PARASITE.

XIPHIDRIA ATTENUATA ♀.

X. attenuatus Nort., Proc. Ent. Soc. Phila., i., p. 144 (1862), ♂.

“ “ Trans. Am. Ent. Soc., ii., p. 354, ♂.

♀. Head and thorax black; tibiæ and tarsi pale; wings hyaline; abdomen red, with six yellow spots. Length 0.40 in.; expanse 0.64 in.

Antennæ 16-jointed, black, piceous beneath, especially towards tip. Face below and between antennæ, palpi and base of mandibles, fulvous. Eyes, except for a short space above, bordered with yellow, the border covering nearly the whole cheek and the anterior and posterior borders extending backwards to meet on the edge of the occiput, thereby enclosing a spot above the eyes which is black in the centre but shading through piceous into the yellow borders. Space about the ocelli finely rugose, with delicate ridges radiating from each ocellus; vertex behind ocelli polished. A pit or deep puncture midway between lower ocellus and the insertion of antennæ. Thorax closely and finely rugulose, scutellum and enclosure on basal plates polished. Tegulæ, minute spots before tegulæ, one each side above anterior wing, and the cenchri, yellow. Trochanters, tips of coxæ and of femora dull yellow; femora piceous, posterior pair black; basal half of tibiæ and basal joints of tarsi, except at tip, yellow; the remainder of tibiæ and tarsi fulvous, becoming brownish on the posterior tibiæ. Wings hyaline, iridescent, nervures and stigma pale piceous. Basal half of the first segment of abdomen black and roughened with fine confluent punctures; the remainder of this segment and portions of the terminal segment are darker than the other segments of the red polished abdomen. A yellow spot on each side of segments three, four and seven, those on the seventh segment being the largest. Sheath of the ovipositor black; abdomen beneath, except at base of ovipositor, red.

One specimen. Connecticut, June 6th, 1873.

Taken from a dead stick of *Betula nigra*. My attention was drawn to the spot by finding a *Rhyssa humida* (Say) with its ovipositor firmly driven into the wood. Upon cutting into the stick, this specimen, together with a pupa of the male and several horn-tailed larvæ, were found. The antennæ of the pupa are bent down upon the sides of the face and up along the back of the head. One of the larvæ changed to pupa (female, length 0.32 in.) on the 21st of July. The male agrees well with Norton's description as given in the Trans. Am. Ent. Soc., and is very unlike the female.

RHYSSA HUMIDA (Say, Bost. Jour., ii., p. 224, female. Walsh, Tr. St. Louis Acad. Sci., iii., p. 108, female).

The specimen differs from Say's description only in minute characters of sculpture and coloration which Say omitted, but which appear in Walsh's more detailed account. From Walsh's description it differs in having no white spot on the metathorax and no "faint, brown cloud in the inner angle of the radial area." The length of body is slightly less than half an inch.

A NEW CATOCALA FROM FLORIDA.

BY A. R. GROTE, A. M.,

Director of the Museum, Buffalo Society Natural Sciences.

Catocala sinuosa, n. s.

This species is allied to *C. coccinata*, but very distinct from that and all other described species. Fore wings whitish gray, paler, but lines much as in *coccinata*. The t. p. line has the double sub-equal teeth and the long inward and thicker indentation above internal vein. Hind wings crimson. The median band reduced to a sinuate, unusually narrow and abbreviate fascia which looks like an elongate discal mark rather than the usual band. Hind margin with the black band continuous, not quite attaining anal angle. Beneath largely shaded with bright red on both wings, the black fascia reduced to unusually narrow stripes; on the hind wings discontinued. Abdomen gray. Size of *coccinata*. Very different in character from the Texan var. *circe* of *coccinata*, which seems to intergrade with the type form. Two specimens Florida, Mr. Albert Kæbele.

REMARKS, CRITICAL AND SUGGESTIVE, ON THE GENUS
LIMENITIS EAST OF THE MISSISSIPPI.

BY ROBERT M. GREY, KENWOOD, ALBANY CO., N. Y.

Demonstrations from examples taken by me during the past three years, and from examples taken in Farmington, Conn., twenty years ago, give indubitable evidence that our *Limenitis* are plastic forms of one species, accommodating themselves readily to the environment, assuming colors from climatic effect or different seasons and localities, or for purposes of protection—the form *L. disippus* being mimetic of *plexippus*, as already suggested by authors. My conclusions are drawn from the following observations: Near the Hudson River I find *ursula* and *proserpina* in close association, each partaking of the markings of the other, evidently one brood, alighting on the same heap of pomace; expansion of wings three to three and a half inches. About six miles from the river *ursula* and *proserpina* are equally abundant, with a few *arthemis* and rarely a *disippus*. Expansion of the wings of the four about two and a half inches; all found in one glade. From this to the highest tables of the Helderberg Hills, *ursula* gradually disappears and only *proserpina* and *arthemis* are found, the latter most abundant. In the low lands *disippus*, *ursula* and *proserpina* are only found; in intermediate broken lands *ursula*, *proserpina* and *arthemis* are chiefly found; at the highest altitudes only *proserpina* and *arthemis* are found, and examinations of many examples from the different localities show that these forms approach each other very closely.

In December, 1877, I sent a melanitic form of *disippus* to W. H. Edwards, Esq., for his examination, and in a communication written to Mr. Edwards at the time, I ventured the assertion of all being one species. As Mr. Edwards did not notice it in a future communication, I took it as a gentle way of dealing with an absurdity. From captures made since I am convinced that all our *Limenitis* have one origin. In proof I have in my collection a *disippus* without the division line on secondaries; some with narrow and others with broad mesial lines. In one example the dividing line is extended to a broad band, with blue crescents in marginal, and red lunules in submarginal band. An *arthemis* from the white band to margin is the exact counterpart of it; in one example, on the under surface of secondaries inside of mesial line, are white lunules.

I have a melanitic form of *disippus* with all the markings of *ursula* on the under surface, and an *ursula* that mimics this at the apex of superior wings, and is suffused with tawny red to base of wing. One *ursula* has a bright red under surface, and so on through many examples blending into each other in color, proving all to be of one origin. The larvæ feed on much the same food plants. The larvæ of *disippus* and *ursula* are held by many collectors to be undistinguishable.

ANOTHER BEE ENEMY.

BY A. J. COOK, LANSING, MICHIGAN.

About one year ago I received a small bug from a gentleman in Maryland, together with the information that it was a serious enemy of the honey bee. It was stated that this bug would lie concealed among the flowers, and upon occasion would grasp a bee, and, holding it off at arm's length, would suck out its blood and life. More recently, I have heard of the same insect, with the same habits, in Iowa, Missouri, Illinois, and more recently, through the editor of *Gleanings*, from Minnesota, and later still, from V. W. Keeney, Shirland, Ill. In one case it was stated that the bug had the power, which it was not slow to use, of stinging quite severely. This same insect has been observed by both Prof. W. J. Beal and myself, at this place, resting on flowers, in which it is often almost concealed, awaiting an opportunity to capture and defluidize its prospective victims.

WHAT IS IT?

This is a Hemipteron, or true bug, and belongs to the family *Phymatidæ* Uhr. It is the *Phymata erosa*, Fabr., the specific name *erosa* referring to its jagged appearance. It is also called the "stinging bug," in reference to its habit of repelling intrusion by a painful thrust with its sharp, strong beak.

BIBLIOGRAPHY.

This insect is mentioned by the lamented Dr. B. D. Walsh (Am. Entomol., vol. 1, p. 141), who facetiously compares its intelligence with

that of the highest bipeds, who are often ignorant of the difference between a bee and a beetle, nor could they safely grasp the former. Yet this humble bug does know the distinction, and holds the bee well off, so as safely to suck out its substance. On p. 25, vol. 2, of the same work, this insect is briefly described and its habits given. Dr. A. S. Packard speaks of this stinging bug, in the *American Naturalist*, vol 1, p. 329, and also in his *Guide to the Study of Insects*, p. 552, where the insect is figured. Mr. Townend Glover, late of the Agricultural Department, in his beautiful work on the Hemiptera, p. 57, has described the habits of this bug, and has given three figures of it, Plate III., Fig. 13. Prof. P. R. Uhler, our greatest American authority in this sub-order, in "Hemiptera West of the Mississippi," p. 58, speaks of the habits of the *Phymata erosa*. In the current volume of the *Country Gentleman*, p. 551, the able entomological editor, Prof. J. A. Lintner, in response to a correspondent, gives a brief account of the habits, etc., of this same insect.

DESCRIPTION.

The "stinging bug" (Fig. 1) is somewhat jagged in appearance, about three-eighths of an inch long, and generally of a yellow color, though



FIG. 1.—Side view, natural size.



FIG. 2.—Magnified Twice.

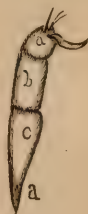


FIG. 3.—Beak, much magnified.

this latter seems quite variable. Frequently there is a distinct greenish hue. Beneath the abdomen, and on the back of the head, thorax and abdomen, it is more or less speckled with brown; while across the dorsal aspect of the broadened abdomen is a marked stripe of brown (Fig. 2, d, d). Sometimes this stripe is almost wanting, sometimes a mere patch, while rarely the whole abdomen, is very slightly marked, and as often we find it almost wholly brown above and below. The legs (Fig. 2, b), beak and antennæ, a) are greenish yellow. The beak (Fig. 3) has three joints (Fig. 3, a, b, c) and a sharp point (Fig. 3, d). This beak is not only the great weapon of offence, but also the organ through which the food is

sucked. By the use of this, the insect has gained the soubriquet of stinging bug. This compact jointed beak is peculiar to all true bugs, and by observing it alone, we are able to distinguish all the very varied forms of this group. The antenna (Fig 4) is four-jointed. The first joint (Fig. 4, a) is short, the second and third (Fig. 4, b and c) are long and slim, while the terminal one (Fig. 4, d) is much enlarged. This enlarged joint is one of the characteristics of the genus Phymata, as described by



FIG. 4—Antenna, much magnified.



FIG. 5—Anterior Leg, magnified—exterior view.

Latreille. But the most curious structural peculiarity of this insect, and the chief character of the genus Phymata, is the enlarged anterior legs (Figs. 5, 6 and 7). These, were they only to aid in locomotion, would seem like awkward, clumsy organs, but when we learn that they are used to grasp and hold their prey, then we can but appreciate and admire their modified form. The femur (Fig. 5, b) and the tarsus (Fig. 5, a) are



FIG. 6—Interior view.

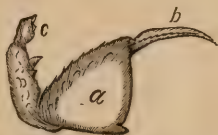


FIG. 7—Claw extended.

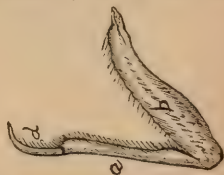


FIG. 8—Middle Leg—much magnified.

toothed, while the latter is greatly enlarged. From the interior lower aspect of the femur (Fig. 6) is the small tibia, while on the lower edge of the tarsus (Fig. 6, d) is a cavity in which rests the single claw. The other four legs (Fig. 7) are much as usual.

HABITS.

This insect, as already intimated, is very predaceous, lying in wait, often almost concealed, among flowers, ready to capture and destroy unwary plant lice, caterpillars, beetles, butterflies, moths, and even bees

and wasps. We have already noticed how well prepared it is for this work by its jaw-like anterior legs, and its sharp, strong, sword-like beak.

Mr. Keeney says he caught the one he sent on golden rod. This plant, from its very color, tends to conceal the bug, and from the very character of the plant—being attractive as a honey-plant to bees—the slow bug is enabled to catch the spry and active honey-bee.

VERDICT.

As Prof. Uhler well says of the "stinging bug": "It is very useful in destroying caterpillars and other vegetable-feeding insects, but is not very discriminating in its tastes, and would as soon seize the useful honey bee as the pernicious saw-fly." And he might have added that it is equally indifferent to the virtues of our friendly insects like the parasitic and predaceous species.

We note, then, that this bug is not wholly evil, and as its destruction would be well-nigh impossible, for it is as widely scattered as are the flowers in which it lurks, we may well rest its case, at least until its destructiveness becomes more serious than at present.

TO OUR ASSOCIATE MEMBERS.

By referring to the second page of the cover of the present issue, it will be seen that the yearly fee for associate members of the Entomological Society of Ontario has been reduced—those residing in the United States to one dollar, those in Great Britain to four shillings sterling. We sincerely hope that this reduction will result in a considerable increase in our membership. Our journal is doing a good work and we are anxious to enlarge the sphere of its usefulness. If each one of our members will exert themselves a little and send in their own and as many additional subscriptions as they can obtain, they will greatly aid us in our endeavors to further the interests of Entomology.

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The Canadian Entomologist.

VOL. XI.

LONDON, ONT., FEBRUARY, 1879.

No. 2

THE GOLDSMITH BEETLE (*Cotalpa lanigera*).

BY THE EDITOR.

This is, without doubt, the most beautiful of our leaf-eating beetles. It is nearly an inch in length (fig. 9), of a broad oval form, with the wing cases of a rich yellow color, with a pale metallic lustre, while the top of the head and thorax gleams like burnished gold of a brilliant reddish cast. The under surface has a polished coppery hue, and is thickly covered with whitish wool; this latter characteristic having suggested its specific name *lanigera* (wool-bearer).



Fig. 9.

This insect appears late in May and during the month of June. It is distributed over a very wide area, embracing most of the northern United States and Canada, and although seldom very abundant, it is rarely that a season passes without more or less of them being seen. During the day they are inactive and may be found clinging to the under side of the leaves of trees, often drawing together two or three leaves—which they hold with their sharp claws—for the purpose of concealing themselves. At dusk they issue from their hiding places and fly about with a buzzing sound among the branches of trees, the tender leaves of which they devour; the Pear tree, the Oak, Poplar, Hickory, Silver Abele and Sweet Gum all suffer more or less from their attacks. Like the May Bug, this beautiful creature is often attracted by light, and flies into open windows on summer evenings, dashing in a bewildered sort of way against everything it meets with, to the great alarm of nervous inmates. In some seasons they occur in considerable abundance, and may then be readily captured by shaking the trees on which they are lodged in the day-time, when they do not attempt to fly, but fall at once to the ground.

The beetle is short-lived. The female deposits her eggs in the ground during the latter part of June, and having thus provided for the continuance of her species, dies. The eggs are laid during the night, singly and at different depths, the number probably not exceeding twenty in all. They are very large for the size of the beetle, being nearly one-tenth of an inch in length, of a long ovoid form and white translucent appearance.

In less than a month the young larva is hatched; it is of a dull white color, with a brown polished horny head and the extremity of the abdomen lead color. The mature larva (fig. 10) is a thick, whitish, fleshy grub, very similar in appearance to that of the common May Bug, familiarly known as "the White Grub." It lives in the ground and feeds on the roots of plants, and on this account it is sometimes very destructive to strawberry patches.



Fig. 10.

Several years are required to bring this grub to maturity; finally it reaches its full growth in the fall, and changes to the perfect beetle early the following spring.

THE SCIENTIFIC NAMES OF INSECTS.

BY GEORGE D. HULST, BROOKLYN, N. Y.

It is our desire in the present article to call attention to two pretty well established laws of nomenclature, that with a few seconding words on our part, the laws may, "to those whom it may concern," preach the importance and necessity of their being observed and obeyed.

1st. "All scientific names must be Latin or must be Latinized." The laws which govern the structure of the Latin language must apply in every case in the making of the binomial combination.

In the making of the binomial, four methods of construction are in use. The generic name is always a noun. The specific name is (a) a proper name in apposition with this, as *Papilio ajax*, the *Papilio* called *ajax*; (b) an adjective giving some description or characteristic, as *Colias occidentalis*—the western *Colias*, *Cossus Centerensis*—the *Cossus* living at

Center ; (c) a noun in the genitive case, giving the food plant, the country in which it lives, or the person in whose honor it is named, as *Pyrameis cardui*—the *Pyrameis* of the Thistle, *Argynnis Edwardsii*—Edwards' *Argynnis* ; (d) a noun with a participle understood governing it, as *Thecla M-album*, the *Thecla* with a white M.

In following these, which we believe include directly or indirectly all combinations, the rules of Latin grammar must apply. Under class "a" a feminine name must not be joined to a masculine noun. It is just the same as saying the girl John, as to utter such a combination as *Melitaea phacton* or *Danaïs archippus*. Duty in the matter is simple and easy. *Fulius* and *Fulia* are exactly the same word, with terminations to express sex. A person comes to us clothed as a man, and professing to be a man, and is called Julius. It transpires afterwards that this person is a woman ; we must, by the compulsion of language and her sex, call her Julia. We must, or ought to, write and say *Melitaea phactona*, *Danaïs archippa*, and so on through the list.

Under class "b" the adjective must be Latin, and must agree in gender with the generic noun. A word is not necessarily Latin because it ends in *us* or *a*. Combinations to express specific points are important and to be sought after, but should be made according to law, and in all cases the gender of the adjective should agree with the gender of the noun—*e. g.*, we should write—we *must* write, if our worthy Editor will allow me so to say—*Papilio brevicaudus* Saun., not *P. brevicauda* Saun. This error is a wonderfully common one, but can be very easily remedied.

Under classes "c" and "d" mistakes are not often made. But while it may be Latin, it is not always the best Latin, to make a proper name by adding *us* or *ius* to what is English. It certainly is curious that the vast majority of modern Latin names are of the second declension. One can look through a catalogue and not find an example of the third. Still, as long as it is grammatically correct, no fault can be found with a proper name, though it be an anomaly like *Pap. Coon*, or a curiosity like *Hewitsonius*, in place of *Hewitson*, genitive *Hewitsonis*.

Authors are not always to blame for the bad Latin. Their species are tossed from genus to genus, as systematising goes on ; but we have about reached the possible limit of genera, and species are probably settled in the places they will occupy, and, as a rule, all new genera are feminine. Our catalogues ought to give, so far as possible, an end to these errors. It

is a pity that some of them seem to be beyond remedy, some which, by reason of the combination, have a ludicrous meaning, as *Sesia Schmidtii-formis*; some are beyond change, because the specific word has no feminine form, as *Eudaimonia Jehovah*. The former combination is allowable, for the Latin will pass muster; and perhaps the honored Mr. Schmidt is such an attenuated example of that well-known group of the genus homo, that the meaning is after all applicable. But the latter combination cannot be defended. "This is a free country," and each one can follow out his own ideas of what is reverential and fitting, but our freedom gives no right to murder either language or sense. Just translate the binomial, *Eudaimonia Jehovah*, the beautiful female demon Jehovah; I suppose *demon* is right enough, for the insect has long tails, and as Spenser would put it, "fearfulle horns," but take it altogether, there seems to be, to put it very mildly, some incongruity. We hope Mr. Strecker, who has been our very kind and generous friend, will not leave that name as a monument for future scholars to gaze upon and wonder at. And we wish cataloguists would be bold enough to put such, and all monstrosities, into some proper shape, for the sake of those who read and for the sake of the authors. We would like the future to have kindly feelings towards all of us who will then be the past.

2nd. "Specific terminations must be made to conform to terminations universally received, and subserving a useful purpose." This, of course, if construction and sense will allow. The Tineina, Tortricina, Pyralidina and Geometræ have each, as a rule, certain specific terminations. Mr. Packard has done the science a good turn in his "Geometrid Moths," by giving the proper-terminations to all specific names. But grammar and sense are the highest law, and so there may be redemption even for Mr. Schmidt from his sad fate.

We are aware much can be said against these laws, which we do not pretend are laws as uttered by competent authority. There are two arguments to defend their disobedience: (a) the following of them will make now, and for all time to come, endless confusion; and (b) the specific name is not an *adjective*, but a term to express the individual—as we say among men, its *Christian name*. It is as proper to say *Mary Thomas* as to say *John Thomas*. It is as proper to say *Argynnis montinus* as to say *Argynnis montina*. It is the *Argynnis* whose given name is *montinus*. To the argument "a" we say, then we ought to give up the pretence of writing scientific names in Latin. There is no possible con-

fusion to those who understand that language, and check lists and catalogues create the nomenclature of those who do not. To the argument "b" we say, while we confess what would otherwise be grammatical errors are thus justified, it is impossible to look upon this family idea as existing in fact. Gender may be arbitrary in some languages, but it is arbitrary to the individual word only. The sun may be considered masculine, but then *all suns* are masculine. If *Papilio* be masculine, then all *Papiliões* are masculine. And, taking the generic name as a family name, so that promiscuously masculine and feminine words may be joined to it, there are already existing and universally received names which could not thus be used—*e. g.*, *Pyrameis cardui*, and all names, such as *Argynnis Edwardsii*, named in honor of any one. If the specific name is an individual name, it is indeclinable unless with the generic name. And surely, then, these must be *Pyrameis carduus* and *Argynnis Edwardsius*. Again, if specific names are given names, they should always be begun with a capital letter—which in descriptive adjectives (more common as names of the *Geometræ* and *Noctuæ*), no one ever thinks of writing. And yet, again, it is impossible to get a noun or name idea in specific names which is an adjective. We remember how the old Puritans ransacked the Bible and their own brains to get expressive names for their children; but they gave the names in the noun form. It was Charity, not Charitable—or at the most, if an adjective, it was grammatical in its use. The adjective idea remains permanent. *Hepialus argenteo-maculatus* is, it is true, the *Hepialus* called by that name; but it is as well true that it is the *Hepialus* that is silver-spotted. We may be dull, and that may be the explanation, but we cannot comprehend that the names of insects are arbitrary, as are the names which designate men and women.

Can we not rightly make an appeal for the observance of these laws?

ANNUAL REPORT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO FOR THE YEAR 1878.

The Annual Report of our Society to the Department of Agriculture of Ontario has just issued from the press, and will be mailed to our members in the course of a few days.

ON GRAPHIPHORA AND NEW N. AM. NOCTUIDÆ.

BY A. R. GROTE, A. M.,

Director of the Museum, Buffalo Society Natural Sciences.

As our acquaintance with the numerous forms of this group increases the arbitrary division of the individuals into species and the species into genera becomes a matter of increasing difficulty. At the same time this does not absolve us from a careful study of the organism in all its parts, and a correction of former groupings becomes as obligatory as the publication of the original observation. The limits of the genera *Mamestra* and *Graphiphora* are not always easy to establish from the imago, widely though they are usually separated. Both are distinguishable by the hairy eyes from all naked-eyed Noctuæ, and by the unarmed tibiæ from all genera (e. g. *Agrotis*) which have one pair or more spinose. But *Mamestra* is tufted more or less obviously on thorax and dorsum of abdomen, and *Graphiphora* (= *Taeniocampa* of authors) is without these tufts. Specimens received from California, and not in very good condition, have been referred by me to *Mamestra* and *Dianthoeia*, which, from fresh material received from Dr. J. S. Bailey, I now refer to *Graphiphora*. These are :

*Graphiphora puerilis.**Mamestra puerilis* Grote, Bull. B. S. N. S., II., p. 9.*Graphiphora rufula.**Dianthoeia rufula* Grote, Bull. B. S. N. S., II., p. 64 (May, 1874).

The genus *Dianthoeia* is established for *Mamestras* with exserted ovipositors. I have elsewhere expressed the idea that such a division is untenable, because species very similar in general appearance are separated by it. And in *Graphiphora* we have species with the ovipositor exserted (*oviduca*) and not (*incerta*). So far as I can see, the relative position of the ovipositor may vary in one species. The type of *rufula* has it exserted. Fresh females show no evidence of it. There is a variation in the color of *rufula* from reddish to gray, which is interesting. The variety at first sight looks like a different species, but I have a specimen which seems to me intermediary in shade, and we have a wide range of color in *incerta*. Among the species which I now range among the *Graphiphoræ* is

Graphiphora modesta.

Dianthoeccia modesta Morrison, Proc. Bost. Soc. N. Hist., 144, Nov., 1874.

I retain in *Mamestra Dianthoeccia meditata* Grote, which shows a series of minute abdominal tufts at base, and on this and other accounts does not seem to me to be intimately allied to *modesta*.

The species of *Graphiphora* may be divided according to the structure of the male antennæ. At the present time I only indicate the following two genera which we may not be able to distinguish from *Graphiphora*. I am not able to distinguish them myself, but am more concerned to draw in genera of my own erection at the present writing. Renewed attention must be paid to them when more material is accessible. These are *Orthodes* of Gueneé and *Pseudorthodes* of Mr. Morrison. A small species hitherto referred to *Himella*, and found both in California and the East, I now refer to *Graphiphora*.

Graphiphora furfurata.

Himella furfurata Grote, Proc. Ac. N. S., Phil., 201, 1874.

I have only the type of *fidelis* before me. I now think that this species should not be separated generically from *Graphiphora*. It approaches in appearance *G. contrahens*. If we divide the genus into groups we may use *Himella* for the group in which the males have impectinate antennæ and the species a slender habitus. I believe, however, as above stated, that *Orthodes* will be used as a sub-genus, when *Himella* may come to fall away altogether.

Graphiphora fidelis.

Himella fidelis Grote, Proc. N. S. Phil., 201, 1874.

I can also find no characters to warrant the separation of *Acerra*. The two species are Californian and are characterized by the large fused stigmata. They approach in structure to *incerta*. The abdomen seems shorter than usual.

Graphiphora normalis.

Acerra normalis Grote, Bull. B. S. N. S., II., 162 ; Check List, pl. 1, fig. 4.

Graphiphora muricina.

Acerra muricina Grote, Bull. B. S. N. S., III., 85.

In ornamentation *G. Behrensiana* resembles these two species, and the abdomen also seems shorter than usual.

Among the species of *Mamestra* which may come to be removed to this genus is *M. lorca* Guen. Several other species show no or little tuftings, and their position cannot be considered definite until we have fresh reared specimens and can be guided also by our knowledge of the preliminary stages.

Graphiphora Garmani, n. s.

♂. Roughly haired. Eyes hairy. A stouter and larger form than *incerta*. Antennæ brush-like, not pectinate, the joints knobbed. Rich brown with obsolete ornamentation. Stigmata approximate, concolorous, moderate, entire, ringed narrowly and the reniform incompletely with black. T. p. line double, even, with pale included shade, much as in *contrahens*, but more sinuate inferiorly. Subterminal line brought into prominence by black scales sub-apically and again more noticeably below vein 4. Fringes concolorous, cut indistinctly with pale at extremity of nervules. Hind wings dusty, with warmer fringes; discal spot from under surface apparent. Thorax dark brown, untufted. Beneath the wings show discal dots and faint exterior line. The color is light brownish, somewhat irroratè. *Expanse* 36 mil.

One good specimen from Northern Illinois, collected by Prof. N. H. Garman. At once distinct from any of the varieties of *incerta* by the impectinate antennæ.

Graphiphora perbrunnea, n. s.

♂ ♀. A small form with ciliate antennæ and hairy eyes, allied to *puerilis* by the white discal mark and in color recalling *Hadena fractilinea*, but more reddish. Veins black. Reniform narrow, black, bordered outwardly by a white streak. Median space superiorly shaded with black. T. p. line even, angulated on vein 5 opposite the disc, followed by venular dots. Orbicular indistinct, concolorous, defined by black scales. Fringes black with white venular dots. Veins broadly marked with black on terminal space. S. t. line shaded anteriorly with brown. Ground of the wing bright reddish brown. Hind wings blackish with contrasting pale reddish fringes. Thorax reddish brown, abdomen blackish with reddish lateral and anal hairs. Beneath pale with distinct exterior common line even on fore wings, dentate on secondaries, which latter show the discal dot distinctly. Feet dotted. Pectus pale reddish.

Expanse 30 mil. Several fresh specimens from California near San Francisco, given me by Dr. James S. Bailey.

Heliophila dia, n. s.

♂. This is a small species allied to *commoides*, but no larger than *ligata*. All the veins are striped with white. The median vein more broadly so. The transverse posterior line is a distinctly continuous series of venular dots. No dark shades accompanying the median vein, which is a distinctive character. The color is that of *commoides*, but a little paler. Hind wings fuscous, whitish towards the base; fringes pale. Thorax pale gray. Beneath paler, the inception of the common line shows as a black mark on costa. Tibiæ well clothed. Head and fore tibiæ dusky. Eyes hairy. The ground color of primaries is seen to be pale dull yellowish with longitudinal brownish shadings. No dark shade along internal margin. Three fresh males examined, sent from San Francisco to Dr. James S. Bailey. *Expanse* 28 to 32 mil.

I have recently seen in Eastern collections three determinations of species of Noctuidæ which are probably authentic, at least there is nothing that I can find in print which contradicts the idea that they are correctly determined. I found a specimen of *Copablepharon absidum* Harvey labeled *Aedophron grandis* Strecker. A specimen of *Schinia gracilentia* Hübner named *Heliiothis imperspicua* Strecker. A specimen of *Aspila rhexiae* Abb. & Smith labeled *Heliiothis spectanda* Strecker. Some species from California, so briefly described in Mr. Strecker's work as to be unrecognisable, are also in part identical with species previously published by myself. But none of these species under MSS. names of Dr. Behr's can be considered as described in a manner which will lead to their identification. For instance, *Dryobota Californica* is, as I learn, *Xylomiges hiemalis*. It is merely compared with a European species which has naked eyes, whereas in the Californian insect the eyes are hairy, and it is not related to the European species of *Dryobota*. I am much interested in finding out all of these species and several others described by Mr. Morrison. Any one having any of Mr. Morrison's species authentically determined, which are marked with a— in my Check List, I would be much obliged were they to be communicated to me. This is especially needed in the genera *Taeniocampa* and *Polia*. Of these I only know *T. modifica*.

NOTES ON THE LIFE-HISTORY OF THE BLISTER-BEETLES
AND ON THE STRUCTURE AND DEVELOPMENT
OF HORNIA.

BY PROF. CHAS. V. RILEY.

(Abstract.)

At the Hartford (1874) meeting of the Association, Mr. Riley described the newly-hatched larva of some of our common Blister-beetles; but all attempts to trace their habits had proved futile, both in this and other countries, until 1877, when he discovered that they preyed on the eggs of locusts (Acrididæ). In a paper published in the last volume of the Transactions of the Academy of Sciences, of St. Louis, the life-history of several of our common Blister-beetles is traced. The present paper gives a brief resume of the facts there recorded, showing that the beetles belonging to the genera *Epicauta* and *Macrobasis* go through the same curious hyper-metamorphoses as do other species of the family *Meloidæ*, and especially as *Meloe* and *Sitaris* were already known to do. The larva hatches as an active, pale-brown, long-legged creature, termed *triungulin* on account of its three-clawed tarsus. It then changes to what Mr. Riley calls the *Carabidoid* stage, in which it is white, less active and fleshy; then to what he calls the *Scarabæidoid* stage, in which it is still more degraded and clumsy; then hardens to what he calls the *Coarctate larval* stage, in which it is perfectly helpless and resembles the puparium of many Diptera; then to the final larval stage, in which it is again white and soft and more or less active; then to the true pupa state; and finally to the beetle; existing, thus, in eight distinct states (including the egg), instead of the four in which ordinary insects occur.

The paper is principally devoted, however, to the life-history of a very anomalous, wingless genus of this family, the *Hornia minutipennis* Riley. This insect is degraded and subterranean, and was found in the cells of a common Mason-bee, the *Anthophora abrupta* Say. Its life-history, which was not known at the time the species was described, has been completely made out by Mr. Riley during the past summer. The eggs, which are laid loosely in the burrows of the bee, hatch during the early part of June. The *triungulin* is extremely active, and, in all essential characters, very similar to that of *Sitaris*, one species of which, in Europe, likewise

develops in the cells of *Anthophora*. By means of its tarsal claws and of a pair of pre-anal spinnerets and claspers, it holds on very tenaciously to the hairs of the bee, and is carried on the same into the bee-burrow. When the bee-egg is laid, and before the cell is capped over, this triungulin disengages itself from the bee, and at once pounces upon the bee-egg. After having sucked the contents of this last, it throws off the triungulin skin and assumes the *Carabidoid* stage; thereafter it feeds upon the honey-paste stored by the bee, and, within the cell, goes through all the hyper-metamorphoses characteristic of the family. All the later stages, however, take place within the puffed skin of the *Scarabæidoid* larva, the *Coarctate* larva being well separated therefrom, but the third or final larva having such a delicate skin that it is not easily separated from this last when shed. There is but one brood annually, the pupa state being attained in August, and the beetle maturing all its parts during the autumn, and lying within its numerous coverings until the following May.

The paper contains some interesting details as to the effects of rain both on the bee-larva and the *Hornia* larva; on the vicissitudes that befall the triungulin, its fratricidal propensities when two or more are enclosed in the same cell, and on its adaptability to food supply.

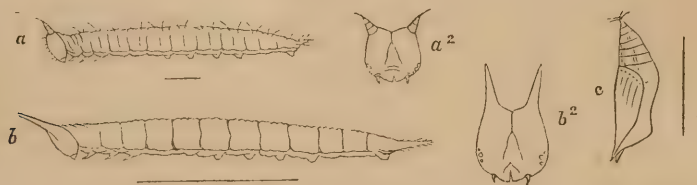
DESCRIPTION OF THE PREPARATORY STAGES OF CENONYMPHA GEMMA.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG—Globular, smooth under a low power, but under a high one, seen to be reticulated in irregular hexagons, the ridges flat and broad, and having at the bottom of each depression a white point; color yellow-green. Duration of this stage in August 3 days, in October 6, in April 6. The egg is laid on grass, which is the larval food plant.

YOUNG LARVA—Length .12 inch; cylindrical, a little thickest in middle, tapering slightly both ways from 8th segment, and ending in two divergent tails, each of which is thick at base and round, tapers to a blunt

point, which emits a white bristle; color of body white; over the surface scattering white hairs. In a few days, and during this stage, the color changes to whitish-green and stripes appear, green and white alternating from dorsum to feet; head sub-pyriform, one-half broader than 2nd segment, broader than high, flattened frontally, and with a slight angular depression at summit; on each vertex a straight, round, divergent horn, thick at base, pointed at top; the horn when magnified is seen to be in three sections, each smaller than the one below it, giving out at the end one or two bristles; color of head and horns blackish-brown (figs. *a*, *a*²). Duration of this stage in August 6 days, in October 9, in April 6.



EXPLANATION OF CUT.—*a*, young larva of Gemma magnified; *a*², head of same; *b*, mature larva magnified; *b*², head of same; *c*, chrysalis.

AFTER FIRST MOULT—Length .18 inch; thicker in middle segments than at last stage, and tapering posteriorly more rapidly; the tails longer, more slender, brown-tipped; each segment several times creased, and upon the summit of each ridge so caused is a row of white tubercles, each with a short white hair; color dark green, banded and striped longitudinally with white; on middle of dorsum a dark green band edged on either side with pale green, and next, on the extreme part of dorsal area, a white stripe; a similar stripe over feet, and between these on middle of side are two white lines contiguous; under side bluish-green; legs and feet green; head sub-pyriform, higher in proportion than at first stage, the top excavated roundly; on each vertex a long, tapering, divergent horn, slightly curved forward, the length being about equal to length of face; color of head brown, pale in front and green-tinted; from base of each horn a dark stripe passes down the side, and in front is a second stripe; horns dark brown. Duration of this stage in August 5 days, in October 10, in May 7.

AFTER SECOND MOULT.—Length .34 inch; shape as at last stage, the tails longer in proportion; color pale green, striped as before;

head deep green in front, dull green at back, the stripes brown and horns brown. Duration of this stage in August 5 days, in May 8.

AFTER THIRD MOULT.—Length .55 inch ; one day later .75 to end of horns, which are held in the plane of the body, the face being bent down as in *Apatura* ; shape as at last two stages ; in the summer and fall larvæ the color of body is now reddish-buff, the dorsal band dark brown ; the sub-dorsal stripe reduced to a broken dark brown line, only distinct at the extreme hinder end of each segment from 3 to 10, making in effect a line of spots ; on the middle of the side a dark brown stripe ; at base a rounded ridge, buff colored, and beneath it a brown line ; head shaped as before, but higher and the horns less divergent ; color of face green, with brown stripes as before ; the horns brown in front, and as well as the head gray-brown behind ; as the larva advances the green of the face is replaced by brown, and the colors of the body change gradually to buff and reddish-gray, the former the dorsal color, the other of the sides (figs. *b, b'*). There was no fourth moult, the stage just described lasting till maturity, at which the larval length was .90 to .95 inch. In the summer (August) brood the larva ceased feeding on the eighth day after the third moult, spun a button of white silk, suspended on the ninth day, and changed to chrysalis on tenth. The larva which I fed in October became lethargic 3rd November. On 24th of that month, after a few warm days, it was discovered to be active, and had recently passed its third moult. It fed at intervals (being kept in a warm room) till the 1st of February, when it suspended and made chrysalis on 4th.

On 17th April, 1878, I captured a female *Gemma*, and obtained a number of eggs, from which eight larvæ reached chrysalis. All these were green at third moult, and to maturity, and the chrysalids were green.

LARVA OF SPRING BROOD, AFTER THIRD MOULT—Color bright yellow-green ; the medio-dorsal band dark green ; on the sides three yellow lines (one sub-dorsal and heavier than the other), and at base a yellow raised stripe ; tails pink-tipped ; head greenish-white on front face and at back, the stripes dark brown, the horns reddish-brown. Time from third moult to chrysalis 5 to 6 days.

CHRYSALIS—Length .52, greatest breadth .14 inch ; shape cylindrical, thickest at 6th and 7th segments ; slightly depressed on dorsum behind base of mesonotum, which is rounded, rather prominent, carinated ; head case truncated, sloping at a low angle from the mesonotum, beveled

at the sides, and ending in two long, three-sided palpi cases, which are sharp and divergent, with an angular depression between them; a cross section of one of these cases would give a right angle, the long side a little convex; wing cases flaring on the dorsal side; color of dorsum and the entire abdomen, in the summer and fall examples, sordid yellow-buff, the wing, antennæ and palpi cases all more yellow; the surface finely streaked with brown, mostly longitudinally and always irregularly; from base of mesonotum to last segment a brown band; the wing cases show an irregular, wavy, brown stripe on the disk and another on the costal margin, and each nervule ends in a blackish dot (fig. c).

In the spring brood the chrysalids were from .46 to .50 inch, breadth .14; color blue-green, the dorsum streaked irregularly with paler or whitish-green; the wing cases finely granulated with pale green, and without any stripe, but the nervules end as in the other form, in blackish dots; there are also two such dots on the inner side of the antennæ cases, at about half their length; the outer edge of the wing cases cream color, and this is continued along the head and palpi cases; the keel of mesonotum lightly marked by same color. Duration of this stage in May and June 8 days.

The attitude of the larva when suspended is peculiar. From last segment to 4th the body hangs almost perpendicular, the dorsal side incurved and ventral correspondingly curved outward; the anterior segments are bent at a right angle, the head being turned down upon second segment. In *Sosybius*, the only other species of *Cœnonympha* whose early stages are fully known to me, the attitude of the suspended larva is that of figure 6. *Gemma* in its larval stages resembles an *Apatura* (*Celtis*) more than it resembles *Sosybius*. It holds the head bent under so that the horns are nearly or quite in the plane with the back. The chrysalis differs materially from any Satyrid chrysalis known to me, that is, from *Sosybius*, *Eurytris* or *Nephele*.

The figures of both larva and chrysalis of *Gemma* in Boisduval and LeConte, Plate 62, are quite wrong, and must have been drawn from some other species. The larva figured has no horns, and moreover is round headed. *Gemma* is not uncommon in this region, but I have found it restricted to certain localities, in open woods, or near woods, and at the proper season I can always find examples by visiting these places. It is three brooded, and, as shown above, I have raised each brood from the egg.

I know no other butterfly which moults three times and no more, but I have verified the fact in this case repeatedly, keeping the larvæ in separate glasses and watching them through all their changes. I use half pint glasses, with tin tops, for all my larvæ, except the largest, as the Papilios, and for these also in their earlier stages, so that it is easy to examine and observe them. No larva moults without an interval of abstention from food, and absolute rest for 24 or more hours, and at this time the skin over head and second segment becomes white and swollen, making it impossible that a moult should be coming on without opportunity of knowing it. Nearly all larvæ moult four times, but *Philenor* alone of the Papilios bred by me, moults five times. Some of the hibernating larvæ moult but four times, as *Nephela* and *Eurytris*, others five times, as the large Argynnids. Some Argynnids which have a summer as well as winter brood, moult four times in the summer. So do *Tharos* and *Nycteis*, but five times in the hibernating brood. *Archippus* moults four times, as does *L. Bachmanni*, the species of *Limenitis*, and *Apatura*, though perhaps *A. Clyton* in some cases passes five moults in the winter brood. It is therefore something quite unusual for a species to be limited to three moults only, as in the case of *Gemma*.

DESCRIPTIONS OF SOME NEW SPECIES OF TABANIDÆ.

BY C. P. WHITNEY, MILFORD, N. H.

Chrysops cuclux.

♀. Length $6\frac{1}{2}$ –9 m. m. Face and cheeks black, shining, separated by yellow pollinose stripes. Frontal callus black, ocellar space blackish ferruginous, the yellow pollen between somewhat infuscated. Palpi blackish ferruginous. Antennæ: first two joints yellow, the second infuscated; third black, base fulvous. Thorax and scutellum black with white hairs, the usual stripes obsolete. Abdomen black, first two segments with a pale yellow lateral spot, seldom attaining the posterior margin of the second segment. The posterior segments with white hairs forming centrally obsolete triangles. Venter black clothed with white hairs. Feet black, sometimes tinged with ferruginous, posterior tarsi yellowish at base.

Wings: root, costal cell, three-fourths of the first basal and the abbreviated cross-band brown. The second basal cell is usually filled as far as the first, but more obscurely. There is sometimes a trace of a cloud beyond the stigma. The cross-band does not attain the posterior margin but crosses the fifth cell, the proximal end of which frequently contains a hyaline spot. A halo along the distal margin.

Seventeen ♀. June, Milford, N. H. One ♀ in Cambridge Museum.

This species is near *sordidus* O. S., but is smaller, lacks the gray posterior margins of the abdominal segment, the cross-band is more abbreviated and lighter colored, and the second basal cell is farther infuscated.

Chrysops nigribimbo.

♀. Length 5-6 m. m. Face ferruginous. Callosities and cheeks dark brown. Palpi brownish. Antennæ black, basal joint yellowish. Front cinereous, callus and ocellar space black. Thorax and abdomen black, sometimes viridescent, the thoracical lines obsolete. Legs varying from black to fulvous; the front coxæ, proximal half of front tibiæ, and the base of the four posterior tarsal joints being lighter colored. Wings: costal cell and stigma yellowish. Cross-band obsolescent, existing only as a brownish-yellow tinge usually vanishing entirely before it reaches the posterior margin, which it sometimes does in the fourth cell. First basal cell filled with the same tinge as cross-band. Second infuscated at extreme base only. In some examples a faint apical cloud is visible under the lens, occupying the extreme distal part of marginal and submarginal cells.

Milford, N. H. Abundant in Pine woods in July.

Chrysops cursim.

♀. Length 7-8 m. m. Face, cheeks and palpi yellow. Antennæ yellow, annulate portion black. Front covered with yellow pollen. Frontal callus fulvous margined above with an interrupted black line. Space around ocelli black. Thorax greenish-brown with yellowish stripes. Scutellum greenish-gray, usually with a transverse fulvous streak. Abdomen yellow. Second segment with two oblique oval spots anteriorly connate, attaining neither margin. The remaining segments with emarginate transverse stripes on the anterior portion. In some examples these stripes are abbreviated, forming two spots similar to those on the second segment and decreasing to the fifth. Venter yellow, apically infusate.

Legs yellow, anterior half of front tibiae, front tarsi, tips of middle and posterior tarsi, extreme tip of posterior femora and distal third of posterior tibiae, black. Wings: costal cell, about one-fourth of first basal, extreme base of second, cross-band, apical spot and a cloud on fifth vein, brown. The cross-band is narrowed posteriorly, reaching the margin in the fourth cell and barely crossing the vein into the fifth. The apical spot is narrow, extending along the costa and filling the apical third of the second submarginal cell.

Six ♀. July. Milford, N. H.

Tabanus superjumentarius.

♀. Length 16-19 m. m. Palpi long, slender, gray, thickly beset outwardly with short black hairs. Face and cheeks gray, with white pollen and hairs. Antennae black, base of joints reddened, upper angle of third joint prominent. Front without ocellar tubercle, coarctate anteriorly, gray with a central brown spot and brown vertex with black hairs. Callus chestnut brown, higher than wide, fusiform above. Eyes naked, unicolorous. Thorax chocolate brown, with white stripes, the middle one narrow, geminate, abbreviate. Thorax and scutellum densely clothed with white hairs. Humeri and pleurae pale carneous with black pile. Abdomen tapering, black, with dense appressed glossy hairs. Segments 3 to 6 faintly margined posteriorly with white, which expands centrally into small triangles on the anterior segments by a few white hairs. Venter black, whitish pollinose laterally, the segments margined with white and with white ciliae. Legs black, with black hairs, base of tibiae testaceous interiorly. Wings tinged with fuliginous. Base, costal cell and stigma pale yellow. A faint cloud on divarication of third vein. First posterior cell slightly coarctate.

Two ♀. July 4. Milford, N. H.

Tabanus Dodgei.

♀. Length 12-14 m. m. Face and cheeks densely covered with light gray pollen and long white hairs. Palpi whitish with white and a few black hairs. Antennae pale yellow, third joint black, upper angle rounded. Front parallel, gray, no ocellar tubercle, callus dark chestnut brown, rectangular, a little wider than high, and frequently emarginate above. A disconnected ovate lanceolate spot above. Eyes pubescent, purple, with two parallel green stripes, the upper wider, and wider than

the intermediate space. Thorax brown with broad white stripes. Scutellum brown with black hairs. Abdomen brown with two broad white stripes of sub-equal width with the space between. Hind margin of segments white. Venter dark, covered with gray pollen, hind margins white. Feet yellowish, base of femora and tips of tarsal joints infuscated. Wings hyaline, costal cell and stigma pale yellow. Veins brown. First cell open.

Nine ♀ received from Mr. G. M. Dodge, Glencoe, Nebraska, to whom the species is affectionately inscribed.

Tabanus sparus.

♀. Length 9-11 m. m. Palpi yellowish-white with a few short white and black hairs. Face gray with white pollen. Antennæ fulvous, third joint compressed, upper angle obtuse, annulate portion black, short. Eyes large, naked, unicolorous, dark green with a purple reflection. Front coarctate, gray, no ocellar tubercle. Callus rectangular, a connate line above. Thorax brown with light gray stripes. Scutellum concolorous. Abdomen dark brown, the segments with white margins, the central triangles smaller than the oblique lateral ones, which are frequently disconnected from the margin on the posterior segments. Venter dark fulvous, black posteriorly, segment margins white. Legs varying from blackish brown to pale yellow, the base of tibiae being lightest. Wings hyaline; stigma pale yellow. First cell open.

Milford, N. H. June and July. Abundant. One ♂, Prof. F. G. Sanborn, same locality, resembles ♀ closely, but the black on abdominal dorsum prevails and the tip of venter is darker.

This species resembles *pumilus* Macq., but is larger; the spots on second segment coalesce with the margin, the eyes are unicolorous, while *pumilus* has two bright green parallel stripes on purple ground.

PARASITE ON THE COMMON HOUSE-FLY.—Prof. Leidy recently stated that in examining various common animals of our household, he found a thread-worm infesting the house-fly. The worm is from a line to the tenth of an inch in length, and lives in the proboscis of the fly. It was found in numbers from one to three in about one fly in five. This parasite was first discovered by Mr. H. J. Carter, the well-known naturalist, in the house-fly of India, who described it as *Filaria muscæ*.—*Science-Gossip*.

CORRESPONDENCE.

SCARCITY OF PAPILIONIDÆ IN NOVA SCOTIA AND NEW BRUNSWICK.

DEAR SIR,—

During the months of July and August last I visited several places in New Brunswick and Nova Scotia, and was everywhere, alike, surprised at the scarcity of Papilionidæ this year. Where last summer there were swarms of *Argynnis aphrodite*, *Colias philodice*, *Nymphalis arthemis*, *nephele*, *alope* and *Pieris rapæ*, I did not see two dozen examples in all. The only *arthemis* I have seen this year is one obtained from a mature larva I picked up on the side-walk near my own residence. I have one *disippus* taken near St. John, July 1st. This species I think is rare here at any time; *turnus* is also rare. *Melitæas* have been about as abundant as usual; *Vanessa antiopa* much less numerous. The commoner kinds of moths which enter our houses at night are remarkably scarce.

In Nova Scotia I found large numbers of the larvæ of *Cynthia cardui*, and later here I have seen the imagines very abundant. *Huntera* is much less common. At Parrsboro', N. S., I found on cultivated grounds several young maples quite defoliated by the larvæ of *Orygia leucostigma*. A careful search failed to discover any on the larch, poplar, willow, mountain ash and other trees and shrubs which were planted thickly around. On the opposite side of the street I saw a small apple tree swarming with these caterpillars, but they do not appear to do as much injury to the apple as to the maple tree. I suggested to the owner of the apple tree that they might be picked off and destroyed before they commenced spinning, but he evidently thought it would be too much trouble. There will likely be a good crop of these caterpillars next year.

CAROLINE E. HEUSTIS, Carleton, St. John, N. B.

DEAR SIR,—

For some two or three years back there has been no little discussion of the question, "What constitutes a genus?" The opinions of many of our lepidopterists and others have been given to the gain of us all. We each had our opinions before the reading of these articles, but now are able intelligently to give a reason for our opinions. And probably the majority have been convinced that the creation of genera upon minute differences is not only unnatural, but ill-advised and unnecessary.

But with the Catalogues of Edwards and Strecker before me, and after viewing the varying conflict between Messrs. Strecker and Grote, I would like to ask "What constitutes a species?" There is certainly a wide difference of opinion among authors upon the subject, and if we are properly, and with profit, to read their articles and study their books, we ought to know the basis upon which they work. I am aware there is, properly speaking, in nature, no such thing as a species defined by precise limits. It is impossible to tell where variety leaves off and species begins, and where one species ceases to be one, and becomes two. But when a person becomes (by the fact that he gives a "Check List" or a "Catalogue" to the public) a professed systematist, we, "the public," have some right to the ideas of truth upon which their work is based. Apart from right, however, I am sure information on this subject will be of general interest and profit. May I therefore ask our friends to "rise and explain?"

Very truly yours,

GEO. D. HULST, Brooklyn, N. Y.

DEAR SIR,—

The paper by Mr. Robert M. Grey in your January number is of great interest. In it Mr. Grey takes the ground that the four Eastern so-called "species" of *Limenitis* are plastic forms of an original species modified by the environment and with essentially differing ranges in latitude and vertical height. The intermediary individuals which bear out this statement, and Mr. Grey's experience in collecting the different forms, are important witnesses to the truth of his discovery. I wish to point out the fact that, in experiments in breeding these different forms, we may not expect to rear all four from one brood of larvæ, as a proof of Mr. Grey's correctness. These forms of *Limenitis* stand evidently in an intermediate position between varieties and species. We may expect, indeed, more or less reversion to be made clear by breeding experiments with them. But we may suppose that these forms, either from climatic or other influences, are partially crystallized. This seems to be inferable from their greater distinctness, more intense than in the cases selected from European butterflies by Weismann and shown in *Papilio Ajax* by Edwards. Experiments will doubtless allow us to arrive at some conclusion respecting the oldest of the forms, which may prove to be *arthemis*.

A. R. GROTE, Buffalo, N. Y.

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No. 3

INSECT POWDER.

BY THE EDITOR.

The Insect Powders of commerce are the powdered flowers of different species of *Pyrethrum*. Those of *Pyrethrum carneum* and *roseum* were introduced some thirty years ago under the name of Persian Insect Powder, and subsequently those of *Pyrethrum cinerariæ folium*, a native of Dalmatia, Austria, as Dalmatian Insect Powder. Both the Persian and Dalmatian powders are good insecticides, but the latter is much the more energetic in its action and hence commands a higher price ; indeed, it is so much preferred that it is gradually driving the so-called Persian powder out of the market. The fact of the flowers of *P. roseum* being less active than those of *P. cinerariæ folium*, has been accounted for on the ground that the single flowers are much more powerful than the double ones, and that the double flowers occur in *P. roseum* in much larger proportion than in the other species. The flowers, either whole or powdered, preserve their activity for a long period. A recent European experimenter states that he could not perceive any particular loss of activity in samples which had been kept for six years. The fresh (undried) flowers act very slowly as compared with the same dried and powdered, and the plant itself powdered is quite inactive. It is singular that while there are many other composite plants closely related to the genus *Pyrethrum*, as yet this peculiar property has been found only in plants belonging to this genus, and even within this limit there are several species whose value as insecticides is very slight. A large number of *Compositæ* indigenous to Austria have been tested and found to be of no value in this respect. The flowers of Tansy (*Tanacetum vulgare*) are said to have a slight stupefying effect.

The *Pyrethrums* are hardy plants which bloom abundantly the second year from seed. The powder is prepared from the half-opened flowers gathered during dry weather and dried in the shade under cover, but the process of gathering, drying and preparing involves so much time that their culture can only be made profitable where labor is cheap.

Insect powders have not attracted general attention as insecticides until within the last three or four years, during which time they have been introduced in various forms in packages and boxes, accompanied by suitable blowers or insect guns for the purpose of properly distributing the powder, and recommended for the destruction of flies, cockroaches, fleas, bugs, &c. Sometimes these prepared articles have been artificially colored so as to disguise their source, but all have owed their activity solely to the presence of the powdered flowers of one or other of these *Pyrethrums*.

House flies are very sensitive to the effects of these powders. A few puffs of the dust from an insect gun, blown into the air of a room with the doors closed, the discharges directed towards those parts where flies are congregated, will stupefy and kill them within a very short time. The powder is somewhat pungent, and to breathe an atmosphere charged with it will frequently cause a slight sneezing, but beyond this the operator need not anticipate any annoyance. Frequently during the past summer, when flies have been troublesome, we have pretty thoroughly charged the air in our dining-room and kitchen at night, closing the doors, and in the morning found all, or nearly all, the flies lying dead on the floors. A few minutes after its use they begin to drop on their backs, and after a very short time die; if a room be closed for half an hour after using the powder, few, if any, will escape. By some this energetic action has been attributed to the presence of a volatile oil in the flowers, by other and later investigators to a peculiar crystalline principle believed to be an alkaloid; but this point does not as yet seem to be fully settled.

More recently we have been experimenting with this powder on the green Aphis which troubles our green-house plants. The usual plan of smoking with tobacco is an unpleasant remedy, and is also very injurious to many plants of delicate constitution, whereas the insect powder used to any extent is perfectly harmless to plant-life. After freely charging the air of a green-house with the powder, blowing it in fine clouds of dust among the plants, the tiny tormentors who are busily engaged in sucking the life out of the leaves and tender shoots, soon manifest symptoms of

uneasiness and begin to drop from the plants to the ground, and in the course of an hour or two the larger portion of the enemy's forces will be found lying sprawling on the earth in the pots or on the shelves and floor of the house, where, probably partly from the stupefying effects of the powder and partly from their natural inability to find their way to any given point, they fail to reach the plants again and hence perish. By applying the powder freely in the evening and giving the plants a thorough syringing in the morning, they may in the worst cases be almost freed from Aphides by a single application ; it is better, however, to repeat its use the next evening, so as to make sure work. The powder does not appear to kill this Aphis as it does the flies. For the purpose of testing this point we placed a number of them in an open glass cell of a microscope slide and powdered them thoroughly, and found some of them alive after two days of such severe exposure to its influence. Having recently found a plant literally swarming with the green Aphis, so that the sight of it was almost disgusting, we submitted it to the action of this powder one afternoon, having previously spread a large piece of white paper under the plant so that the effect of the powder on the insects might be distinctly seen. Almost immediately they began to fall on the paper, and in less than ten minutes a hundred or more of them were lying on their backs or crawling sluggishly about. In the course of half an hour some four or five hundred had fallen on the paper, and when the plant was examined again the following morning, there remained but very few on it, and most of these were removed by a slight syringing. We have had the powder used in green-houses by some of our friends, who also report its success. This matter is well worthy the attention of all those who indulge in window gardening or who grow plants in small conservatories attached to dwellings, since if this proves an efficient and economical substitute for tobacco smoke, it will save much annoyance and some loss. Success will necessarily depend on the quality of the material used, but after the experiments we have tried, we feel confident that with good Dalmatian powder there need be no failure. It will be interesting to learn as opportunity offers how moths and other insects will be affected by the use of insect powders. If the beautiful specimens which sometimes fly into our rooms at night can be drugged in this way and captured without a struggle, we may add many a perfect specimen to our collections which would otherwise be more or less defaced. There is quite a field for experiment here.

THE CLOVER-SEED FLY—A NEW INSECT PEST.

BY J. A. LINTNER, N. Y. STATE MUSEUM NAT. HIST., ALBANY.

In the summer of 1877, my attention was called to some "worms" which had been discovered in the heads of red clover (*Trifolium pratense*), and were said to be preying upon the seeds. They were found to be minute maggot-like creatures, hidden within the seed-pods and entirely destroying the seeds which they attacked. Numbers of them were subsequently detected in the examination of heads of clover taken from several localities in the vicinity of Albany, and in Warren County, N. Y. I was unable at the time to refer the insect to any described species, or to find any record of a similar depredation on clover seeds in this country or in Europe.

The following season, additional examples of infested clover heads were submitted to me, which had been sent from Mr. George W. Hoffman, President of the N. Y. State Agricultural Society, from Elmira, N. Y. A number of the larvæ were obtained from these heads, and their careful examination enabled me to refer them to the Cecidomyidæ—of a species probably closely related to the well-known wheat-midge, *Cecidomyia destructor*. Several of the larvæ were preserved in alcohol, and the larger number placed in a pot of damp sand, in which they speedily buried themselves for their transformation. The perfect fly has not yet made its appearance, but it is hoped that the final change will soon take place and the specimens be secured.

At the recent Annual Meeting of the N. Y. State Agricultural Society, in this city, in January last, in a paper presented to the Society, on some Injurious Insects observed during the past year, I gave an account of this new deprèdator upon an important crop, and described its larva, as follows :

Cecidomyia trifolii, n. sp.—Head subacute, subtriangular, slightly rounded laterally on its posterior half, giving that portion a subquadrangular form ; a short cylindrical horny? process at its tip, and two longer antennal processes, cylindrical, tapering apically. Body elliptical, moderately constricted at the joints, flattened on the sides, rather rounded behind, delicately shagreened, laterally at about the middle of each segment, a short fleshy papilliform process, with two short bristles of unequal

length near the posterior of the segment ; posterior segment bilobed, each lobe armed with two short fleshy ? processes, of which the outer is the longer ; "breast-bone" of a pale yellowish color, its projecting end divided into two rather blunt, laterally rounded, points. A dorsal row of processes similar to the lateral ones is suspected, but was not definitely made out. Color of the living larvæ, pinkish, approaching orange ; length, 0.08 of an inch.

The reading of the paper elicited the information that the insect had committed serious depredation upon clover-seed in Tompkins, Seneca and other counties in Western New York, during the past year. In Seneca County, fields of clover which had been kept for seed, proved to be not worth the cutting. It was also stated that a worm similar to those in the heads had been discovered preying upon the roots, but these are probably the same larvæ, which having matured, had left the heads for their pupation in the ground, where the Cecidomyidæ larvæ frequently remain unaltered for a considerable length of time.

The extent of the ravages throughout our country of this newly discovered insect, which promises to be of considerable economic importance, will be an interesting subject of inquiry for the ensuing summer ; and the interesting question also arises, now that its hidden covert has been detected, will the species also be discovered in Europe, whence the red clover was introduced in this country.

A NEW SPECIES OF ARCTIA.

BY G. H. FRENCH, CARBONDALE, ILL.

Arctia rectilinea, n. sp.

Average length, ♂, .50 ; ♀, .55 of an inch. Expanse of wings, ♂, 1.30 ; ♀, 1.50 inches. Head reddish flesh color, or in some lighter ; eyes and palpi black ; antennæ dark brown or brown black. Prothorax and thorax the same color as the head, the first with two, the second with three longitudinal black lines, those on the thorax with the following arrangement : one dorsal and the other two on the tegulæ. Abdomen bright scarlet, the dorsum either a broad black stripe dentate on the

sides, or broken up into a series of oval black spots, one to each segment ; a row of black spots at the sides.

Under side of body : Thorax blackish, a little dark flesh color in the middle ; abdomen yellowish flesh color, a row of black spots each side of the middle.

Upper surface : Primaries black, marked as follows : with the same shade of flesh color as on the head and thorax ; all the veins, the costa and hind or inner margin, a line running from the base of the wing to the end of the third median veinule, that may be called the sub-discal line, and three transverse lines that extend from the costa to this sub-discal line. The first or inner of these transverse lines is nearly in the middle of the wing, the second crossing the wing obliquely at the end of the discal cell ; these two straight ; the third pursues a zigzag course, starting on the costa between the second and apex, extends to near the base of fringe between the second and third disco-cellular veinules, makes an acute angle and joins the second transverse at the juncture of the first and second median veinules with the median vein ; from this it extends to the end of the sub-discal line. Secondaries bright scarlet with a narrow outer and costal border of black, and a discal spot and three large spots of the same near the outer border. Of these the middle of the three spots is free, but the discal and the first and third of the outer are usually blended with the border.

Under side : Both primaries and secondaries marked as above, but the light on the primaries is more tinged with scarlet, while the scarlet of the secondaries is not so bright.

Described from two males and two females. These were taken in connection with *Arctia Nais* Dru., and like that, seems to be double brooded. The first, a female, was taken May 27th of the past season ; the rest, one male Sept. 15th, and one male and one female Sept. 25th. I have also seen one specimen captured by another person.

NOTES FROM WOLLASTON, MASS.

BY F. H. SPRAGUE.

During the season of 1878 I have found at this place, situated within two miles of the limits of Boston, some species of butterflies which are seldom found in this vicinity. On the 8th of October I obtained a nice

specimen of *C. eurytheme*, which had probably left the chrysalis but a short time before. It was flying in a meadow, in company with great numbers of *C. philodice*. The orange-colored tinge of the wings is lighter than on specimens taken farther south. If I am rightly informed, this is the first instance of the capture of this species in this vicinity.

On the 29th of June a specimen of *L. arthemis* was taken, and another July 3rd; both specimens had just emerged from the chrysalis. The larvæ evidently fed on the *Quercus alba*, which was very abundant in that locality.

A number of specimens of *J. coenia* have been taken here within the last three years, in the month of August or early in September. *Coenia* seems to be rather widely distributed through Massachusetts, and though quite rare, I have found it more common in this vicinity than elsewhere. This species seems to prefer meadows and lowlands to higher ground, and is quite fond of the flowers of the Golden-rod.

THE TAILS OF CALLIMORPHA INTERRUPTO-MARGINATA ♂.

BY C. G. SIEWERS, NEWPORT, KY.*

In a former article in the CANADIAN ENTOMOLOGIST I mentioned a large capture of the above moth in July, 1876 and '77. At the first taking I ran out of pins, and so had recourse to the time-honored practice



Fig. 12.

of squeezing—when, lo! out of the hind segments there issued two plumes over an inch long and less than one-sixteenth in diameter, so light that the least breath of air fluttered them from side to side. They were cut in numerous vertical segments and sparsely covered with short hairs, were semi-transparent and evidently air-inflated; fig. 12 will give some idea of their appearance. I noticed also that only those that had the anal segment tufted with hair possessed these appendages, they being males, the females having a clean terminal segment, and without these organs.

I mentioned this discovery in letters to several scientists at the time, but as it elicited no response, I concluded it was nothing new. On

reading the interesting articles on the organs of *pseudargiolus* by Mr. W. H. Edwards, I mentioned this matter to him, and he at once proposed to test it this season. But the disease that, as I mentioned, had attacked the larvæ, evidently a species of Muscardine, left few survivors, and but five males could be found. These, with some pressed organs, I forwarded to Mr. Edwards, who sent them to Dr. Hagen, at Cambridge.

In a letter from the Doctor, October 15th, he mentions that he was sure he had seen an account somewhere of similar organs, but from lack of time had no opportunity to look it up till then. He found that in *Psyche*, Cambridge, No. 6, October, 1874, Mr. H. K. Morrison has described just the same organs in *Leucartia acraea*, and similar ones in *Agrotis plecta*, *Euplexia lucipara* and *Danaïs erippus*. In *Psyche*, No. 35, March, 1877, Mr. B. P. Mann read extracts from a letter of Fritz Müller to Charles Darwin, published in *Nature*, vol. x., page 102, respecting the presence and character of abdominal appendages in several glaucoped moths, similar to those described by Mr. Morrison. Dr. Hagen adds: "The fact is indeed very interesting and new for *Callimorpha*."

In capturing the *Callimorphas*, which fly with a heavy darting motion but a few yards at a time, it often occurred that on coming to the place where one had settled, no trace of the moth was to be found, it having continued its flight ten or fifteen yards further under the high weeds on which the larvæ feed, *Eupatorium ageratoides*. These seemed to be double flights, but in the summer of 1877, when sugaring at dusk, I was accompanied a long distance by a male *Callimorpha* in a steady flight among the weeds, either following the light or the odor of sugar, and it finally lit on the trunk of a tree, where I captured it, very much to my surprise when I found what it was.

It is plain that by the aid of these appendages they are able to make a sustained flight in search of females or in escaping pursuit. The tails issue from the sides of the segment next the anal, somewhat underneath, slowly on pressure, but collapse instantly when freed, and come out of the detached body even on pressing the next segment to them, and on the dried males two side tufts of hair can be plainly perceived. They seem to furnish the same assistance to flight as the tails of *Luna*, the *Papilio*s and others do. That *Agrotis* and other darting moths have similar organs is very plausible; where there is a want, there is a way, in nature; where a superfluity, it is dispensed with, like the blind eyes of cave fishes.

DESCRIPTIONS OF NEW SPECIES OF BUTTERFLIES COL-
LECTED BY MR. H. K. MORRISON, IN NEVADA, 1878 ;
ALSO, REMARKS ON SOME ERRORS OF
SYNONYMY AND ARRANGEMENT.

BY W. H. EDWARDS, COALBURGH, W. VA.

Argynnis Laura.

Male.—Expands 2.2 inch.

Upper side deep red-fulvous, obscured at base of primaries and still more at base of secondaries, the ground there being black with a slight dusting of fulvous ; the black markings as in the allied species, rather heavy, while the nervules of primaries, especially the discoidal, and the branches of median,—and on secondaries the branches of sub-costal, are widely bordered with black ; the mesial band of secondaries confluent ; fringes yellow-buff, black at the ends of the nervules. Under side of primaries red-orange at base and along the median nervules ; also within the P-shaped spots of cell ; remainder of wing, which includes the outer half of cell, and area to apex and hind margin, yellow-buff ; the upper marginal lunules more or less silvered, as well as the sub-apical spots ; secondaries pale yellow ; the belt between the outer rows of spots broad, clear colored, the spots large and well-silvered ; the basal and discal areas mottled with delicate ferruginous ; in one example, brown, in some lights a little greenish ; the marginal spots broad, rounded, edged with a few black scales ; the spots of second row broad ovals, except fourth from costa, which is minute, and the seventh on margin, irregularly lunate ; all bordered with black anteriorly ; the third row consists of either four or five spots, the third and fifth sometimes one or both obsolete ; the first on costa rounded, the second large, sub-triangular, and fourth sub-lunate ; all edged above with black ; in cell a rounded spot, a long oval in sub-median interspace, both edged with black ; patches of silver at the top of the interspaces at base ; shoulder and abdominal margin well silvered.

Female.—Expands 2.35 inches.

Upper side paler over discal area ; the margins edged broadly with black ; under side very nearly as in male.

From 4 ♂, 1 ♀ taken by Mr. Morrison, and 1 ♂, 1 ♀ formerly sent me by Mr. Henry Edwards. This species may be distinguished by the clear yellow belt between the two outer rows of silver spots, which is

relatively as broad as in *Cybele*. It is of a deeper fulvous than any except *Liliana*, which it resembles in this respect as well as in size and shape of wings. *Liliana* shows a very narrow belt, so encroached on by the unusually large silver spots as to be reduced more than one-half in width.

Satyrus Paulus.

Male.—Expands nearly 2 inches.

Upper side blackish-brown, color of *Nephelè*; both wings have a faint submarginal black line; on primaries two small black ocelli, the upper one with white central dot; fringes brown, on secondaries darker at the ends of the nervules. Under side of primaries brown, yellow-tinted, of secondaries more decidedly colored by yellow; both wings have the hind margins edged with black, just within which is a parallel black line; a little beyond, a second line or fine stripe, not quite parallel to the margin on primaries, and irregularly crenated on secondaries; across disk of primaries a sinuous dark stripe; the basal half of the wing, above median, finely streaked with dark brown; the costal margin sprinkled with same, grayish at apex; the ocelli repeated, but greatly enlarged, with ochraceous rings and small white pupils; in one example these ocelli are of nearly equal size, but in the other the lower one is obsolescent, represented by a brown dot in a small pale brown spot; across the disk of secondaries an irregularly sinuous and partly angular black stripe, and another less distinct near base, the two forming the outlines of a broad band; the whole wing streaked and sprinkled with dark brown, but the streaks are extremely fine and almost obsolete; color from base to outer edge of the band yellow-brown, but beyond the band clouded with gray; the ocelli are from three to six in the two examples examined, in pairs of three in the one case, a tolerably large one forming the middle of each, the others minute, one or two obsolescent; in the other example the ocellus on second median interspace is distinct and pupilled, but the other two are obsolescent.

Female.—Expands 2 inches.

Paler, with the extra-discal area a shade lighter; on this are the two ocelli, the upper one large, with white pupil, the other medium, without pupil, each in pale yellow ring. Under side brown, with a yellow tint and suffused with whitish-gray, largely over the extra-discal area of each wing; all the markings distinct; primaries more heavily streaked than in male,

secondaries very finely streaked; the discal stripe on primaries pretty regularly curved, a little convex outwardly, and projecting a spur along submedian nervure; on secondaries this stripe is wavy and crenated, but not angular, projecting considerably opposite the cell; the inner line is nearly straight across cell and bends at a right angle towards base in the subcostal interspace; the ocelli of primaries scarcely larger than on upper side, and pupilled; secondaries have the ocelli disposed as in male.

From 2 ♂, 1 ♀. The species belongs to the *Nephela* group, and may be distinguished, especially in the female, by the hoary under surface, with distinct markings.

Pholisora oricus.

Male.—Expands 1 inch.

Upper side brown, primaries somewhat dusted with gray scales, and marked with black; across the disk a series of long black serrated spots, the points reaching nearly to hind margin; on the upper three of these are three minute white spots, forming a curved demi-band; a small dull gray spot on the serration which occupies the upper median interspace, and a similar one near inner margin; across the wing near base a black band, also serrated, the upper part only being clearly distinguishable; fringes of primaries brown, with a few white hairs; of secondaries brown. Under side glossy dark brown, a little dusted with gray; the white spots of primaries repeated.

From a single example. This is near *Alpheus*, Edw., a New Mexican species, but is smaller, and is without the whitish spots on under side of secondaries, which are found in that species. *Alpheus* also is without the gray spots on upper side of primaries.

Argynnis Nevadensis, Edw., But. N. A., vol. 1, pl. 33.

This species has long puzzled me, inasmuch as there seemed too much discrepancy in size between the sexes as figured, and difference in the coloration of the under sides. Except in a few species of *Argynnis* where the coloration throughout differs in the sexes, as *Diana*, *Leto*, &c., there is a very close resemblance, so that if two sexes of one supposed species constantly vary in the coloring of under side, and in the form and size of the silver spots, it becomes highly probable that there are two species involved. And I am now satisfied that this is the case with what has been known as *Nevadensis*, since examining the very rich series of examples

sent me by Mr. Morrison. Here are a score of males corresponding in size and coloring of under side with the male of my Plate. Some of them are as pale fulvous above, but most are deeper red. With them are twelve females, agreeing in size, and of same coloration beneath; that is, both are yellow on secondaries, mottled with green. The males expand from 2 in. to 2.3 in., and females from 2.25 to 2.5 inches. On the other hand, here is another series corresponding to the female of the Plate, the under side brown, with olive tint, on yellow ground. The males expand 2.5, the females 2.7 and 2.8 inches. I have now no doubt that the female figured and described is *Coronis* Behr, a Californian species, abundant in some districts, but sparingly represented in Nevada. In this Mr. Henry Edwards agrees. I shall give a Plate of *Coronis* and of the true female of *Nevadensis* in due time.

A. MONTIVAGA, Behr, and allies; and A. Zerene and allies.

I. MONTIVAGA. Mr. Mead also made large collections in Nevada, in 1878, all which I have had the opportunity of examining. Among them were scores of examples of the smaller species of Argynnis, Group I. Mr. Morrison has also sent me upwards of sixty of these, comprising every variation observed by him. I have Dr. Boisduval's type specimens of *Egleis* and *Mormonia*, labelled by himself, the word "type" written on each label. I have also well executed and colored figures of Dr. Behr's Argynnids, Nos. 4 and 5, described in Proc. Cal. Acad., 21st April, 1862, sent me at that time by Dr. Behr himself. In same Proceedings, 1863, Dr. Behr proposed for his No. 4 the name *Montivaga*, but No. 5 received no name from him then or afterward. No. 4 (*Montivaga*) was characterized by the light hue of upper surface as compared with most of the related species; under side of hind wings reddish-brown, with a few diluted spots, those of the intermediate fascia quadrangular rather than oval, and not edged on the marginal side by black. On the other hand, No. 5 is stated to be easily recognised by the black bordering of the intermediate fascia, their oval not quadrangular shape. In 1864, I published a paper entitled "Notes on the Argynnides of California," Proc. Ent. Soc. Phil., in which Dr. Behr's papers were recited and an abstract of them given. In this I said that the author seemed to me to have re-named an old species, viz., *Astarte* Doubl., which appeared to be identical with the No. 4, and I transferred the name *Montivaga* to No. 5. It was afterwards discovered that *Astarte* was not an American species,

and Dr. Behr's name was therefore not a synonym, but became the rightful species name of No. 4, as he originally imposed it. Mr. Strecker, Catalogue, page 114, has recently re-named this species *Arge*, which of course becomes a synonym. For several years, and until Mr. Mead's specimens came to view, I had lost sight of Behr's No. 4, and any examples of it in my collection must have long since disappeared. To this unsuspected loss may be attributed the errors upon this sub-group of species contained in my Catalogue of 1877. I therein gave

123. EURYNOME, Edw., syn. *Astarte*, Edw., not Doubl.

124. MONTIVAGA, Behr, syn. *Egleis* Bois.

125. MORMONIA, Bois.

126. IRENE, Bois. I believe *Irene* to be a good species, but it belongs to a distinct sub-group from *Montivaga* and *Egleis*, near to *Calippe* Bois., through *Liliana* H. Edw., it appears to me. I have Dr. Boisduval's type specimen of it. It is size of *Egleis*, deep red above; below the spots of hind wings are one-half larger than of *Egleis*, those of second row subquadrangular and buff colored, on red-brown ground; and the belt between the two outer rows of spots is narrower than in *Egleis*. Neither Mr. Mead nor Mr. Morrison found it in Nevada. The series of species should therefore run thus:

IRENE, Bois.

Egleis, var. *Irene*, Bois., 1869.

Sub-group.

123. EURYNOME, Edw.

124. MONTIVAGA, Behr, 1863; "No. 4," id., 1862.

Astarte, Edw., not Doubl., 1864.

Arge, Strecker, 1878.

125. ECLEIS, Bois., 1869.

♀ *Mormonia*, Bois., 1869.

Montivaga, Edw., not Behr, 1864.

The No. 5 of Behr is *Egleis* Bois., of which *Mormonia* is the female, as the type specimens show. *Egleis* is larger than *Montivaga*, which last is the smallest of this sub-group found in Nevada and California. It is deeper fulvous above and on the under side very variable, both in the coloration of the ground of secondaries, which varies from buff to yellow, more or less mottled over basal and discal areas with dull ferruginous-brown, lighter or darker. The spots are well silvered, or very slightly, or

not at all, in this last case being of a clear yellow-buff. Sometimes the marginal spots are silvered, the others not. Some examples have the ground with a reddish tint. But whatever the variation in other respects, the spots of second and third rows are heavily edged with black on the basal side. The females agree closely with the males in coloration and variability. In *Montivaga*, the ground of secondaries is red-tinted, the basal and discal areas are pretty uniform reddish-brown, light and not deep; the spots are moderately silvered. In a larger series than I have examined probably some examples would be well silvered, some with no silver at all. The black edging of the spots is at most very slight indeed, often nil, or represented by a few scales only. The females are of same expanse of wing and resemble the males in coloration below, the spots being well silvered; but they are paler on upper side, with the spots corresponding to second silvered row, light colored a little like *Calippe*, as Dr. Behr notices in his first paper spoken of. I have three females lately received from Plumas Co., Cal., and probably this species has a wide range among the mountains.

2. ZERENE, Bois. In Mr. Strecker's Catalogue all the above-named species, and *Rupestris* Behr, with a query, are set down under the title *Zerene*, Bois., as varieties thereof (*Montivaga* everywhere being called *Montivago*, which is not Behr's name). Now *Zerene*, Bois., and *Monticola*, Behr, are either forms of one species, or two species so closely related that Boisduval's diagnosis of *Zerene*, in 1852, covered both of them. *Zerene* has no particular affiliation with *Egleis* or its allies. It belongs to a distinct sub-group. Yet Mr. Strecker places what he allows to be two good species between *Monticola* and *Zerene*, namely, *Hesperis* and *Inornata* (which belong naturally to other sub-groups), besides two species which are just as certainly good and neither especially related to *Zerene* or to each other, namely, *Rhodope* and *Behrensii*, but are given as merely varieties of *Monticola*. His series runs thus: 205, MONTICOLA, var. a. *Rhodope*, var. b. *Behrensii*, var. c. *purpurascens*, H. Edw.; 206, HESPERIS; 207, INORNATA; 208, ZERENE, var. a. *Irene*, var. b. *Mormonia*, var. c. *Montivaga*?, var. d. *Rupestris*; 209, EURYNOME; 210, ARGE. Besides that, *Zerene* and *Monticola* are either one species or stand together in a natural series; *purpurascens* is *Zerene* of Behr (*Hydaspe* Bois.).

Dr. Behr, in the paper of 1862, described a species as No. 8, and in that of 1863, applied to it the name *Monticola*. In a note under his

No. 3, *Leto*, he says "the diagnosis that Dr. Boisduval gives of *Zerene* certainly comprises two species." Giving to one of these the name *Monticola*, he leaves *Zerene* Bois. to the other. The former he characterizes by the under side of its hind wings being deep brown, approaching violet, the latter being cinnamon-colored. All this I set forth in my paper of 1864. before referred to. In 1869, Dr. Boisduval, without apparent knowledge of what had been done in the matter in this country, in his *Lep. de la Cal.*, applied the name *Hydaspe* to what Behr had specified as *Zerene*, using these explanatory words: "This *Argynnis*, of which we have seen very few individuals, perhaps may be a local variety of that which we have before described under the name of *Zerene*. It is a little smaller, its wings are more rounded at summit; the under side of the hind wings is less vinous, with the yellow spots more clear colored and distinct. Besides this, the female has the marginal spots always yellow, like the others, and never silvered as in the female of *Zerene*." I have the type specimen of the male of *Hydaspe*, sent me by Dr. Boisduval, labelled and marked "type." It is cinnamon-colored and Behr's *Zerene*. The *Zerene* figured in *But. N. A.* has the under side of hind wings ferruginous, but in all other respects agrees with Behr's description and type, and was sent me by Dr. Behr as *Zerene*. The cinnamon-colored form I was unacquainted with till several years after my Plate was published, when I received it under the name of *purpurascens*, H. Edw., var. *Edw. But. N. A.*, VI. pl. 32. In this series of examples from Nevada, embracing more than 100, taken by Messrs. Mead and Morrison, the ground color of hind wings varies from bright to dull cinnamon, ferruginous and brown. Some are buff overlaid with diluted ferruginous, including the belt between the two outer rows of spots, here and there the sub-color appearing; some have this belt clear buff and the rest of the wing mottled with a vinous gray. In some the cinnamon or ferruginous largely covers the disk, in others very slightly. Some have the under side of hind wings largely melanized. So with the silvering; some show the spots as clear buff, some buff with a few scales of silver. Of *Zerene*, I have found no male with all spots silvered beyond these few scales, though sometimes the marginal row is moderately silvered. The female varies in same manner, but some examples show more silvering, while others have not a trace of it. The typical *Monticola* of Behr is figured in my Vol. 1, pl. 27, and appears in these Nevada examples, the ground being vinous-brown, mottled with clear brown; the male without silver. But while the females of

precisely same coloration are sometimes quite unsilvered, in other cases they are thoroughly silvered on every spot. Variations of the ground color show a range from diluted ferruginous to brown, and in many instances both sexes are equally and well silvered throughout. In both *Zerene* and *Monticola* every phase of color of under side of hind wings in one sex can be matched in the other sex, and I count seven varieties which are readily distinguishable; and where *Zerene* ends and *Monticola* begins I cannot decide. I am disposed to think, considering that all these variations occur in one locality, that the two forms represent one species, as Dr. Boisduval surmised. If *Zerene* type was peculiar to one district and *Monticola* type to another, I should hold them to be two distinct species, *always bearing in mind that a species is but a permanent variety*. Continuing the series of my catalogue, these species would then read thus:

127. HESPERIS, Edw.

Sub-group.

128. ZERENE, Bois., 1852.

VAR. HYDASPE, Bois., 1869.

Zerene, Behr, 1862.

purpurascens, H. Edw., 1876.

VAR. MONTICOLA, Behr, 1862.

DESCRIPTIONS OF TWO SPECIES OF AGROTIS, AND TWO OF APATELA.

BY A. R. GROTE, A. M.,

Director of the Museum, Buffalo Society Natural Sciences.

Agrotis vocalis, n. s.

♂ ♀. This species seems allied to *albalis* and *lagena*. The hind wings are whitish; the fore wings are mixed gray, black and white. The lines are black, thick, single, dentate, the subterminal obsolete. A slight black basal submedian streak. Orbicular whitish gray, pear-shaped, lying parallel on the cell, tapering outwardly, cell shaded with black, the spot edged with black, not quite attaining the inner edge of the reniform,

which latter is obsolete, its inner curved edge alone visible. Median lines propinquitous, recalling in aspect some species of *Homohadena*. The t. p. line is much exerted medially, retiring inwardly to internal margin, approaching t. a. line as nearly as at costa. The line is dentate, forming points on the veins, followed by pale dots. T. a. line perpendicular, with a more prominent subcostal tooth. Median shade visible. Fringes concolorous. Collar gray, tipped with brownish; thorax darker gray. Abdomen whitish. Beneath whitish with incomplete line and dots. All the tibiae armed. Male antennae brush-like: the hind wings white with soiled veins and a faint terminal line.

Expanse 34 mil. *Habitat* Colorado. Dr. Bailey.

Agrotis vernilis, n. s.

♂. Antennae sub-serrate, ciliate. This species belongs in appearance to the Western species, *Hollemani*, *silens*, *larena*, *albalis** and *choris*, but the fore tibiae appear unarmed. In color it is a darker gray than any of its allies, the hind wings evenly grayish fuscous and more obscure. In ornamentation it resembles *larena*. The lines are obsolete. There is a submedian basal black dash. The median lines are indicated by black costal shades. The outer (t. p.) line is seen to be rounded over the nervules below costa, running well outwardly; in *larena* there is an apparent angulation and the line is less outwardly produced. The veins are finely marked in black as in *choris*. The color is uniformly dark mixed gray; the ordinary spots paler. These latter are complete and distinct. The reniform is moderate, kidney-shaped, shorter, broader, less incised than in *larena*, with a faint internal ring, finely edged with black more noticeably inwardly. The orbicular is similar in color, elongate, oblique, pear-shaped, tapering outwardly to the reniform which it attains; in *larena* it lies parallel with the cell and fuses with the reniform, while differently shaped. T. p. line indicated by pale venular points. Fringes concolorous gray-fuscous. Thorax concolorous with primaries; a fine black line crosses the collar. Beneath fore wings dark, hind wings pale fuscous; a common, transverse, dark, discontinued shade line; discal spot small, open on hind wings, luniform on primaries. Hind wings darkly irrorate on a whitish ground.

Expanse 40 mil. *Habitat* Colorado. Dr. Bailey.

* Mr. Hill has recently taken in Lewis Co., N. Y., a specimen indicating an Eastern species allied to *albalis*.

Apatela distans, n. s.

♂. Allied to *A. brumosa* (= *verillii*), but distinguishable at sight by the narrower wings and in that on primaries the exterior line is much further removed towards the base of the wing, while the hind wings are whitish. These characters will separate this form, of which two or three specimens have come under my notice, from any of the varieties of *brumosa* with certainty. The primaries are more pointed than in its ally; the subterminal space is wider. It is not so bright or varied a gray as *brumosa*; the markings are very similar, the reniform touches the t. p. line on the vein. There is a blackish stain below the basal streak over the claviform, else the wing is evenly mixed fuscous gray, without the black discal and subterminal shadings of *brumosa*. Hind wings smaller than in *brumosa*, smoky pellucid whitish without marks. Beneath whitish with obsolete line. On the primaries above the black streaks inaugurating the transverse lines are more equidistant than in *brumosa*; this is especially noticeable in that the outer of the two component lines of the t. a. line is nearer to the inception of the median shade above the orbicular. The median space is thus seen to be narrower than in its ally and the orbicular appears less isolated.

Expanse 34 mil. Montreal, Mr. Caulfield.

Apatela parallela, n. s.

♂. This species belongs to the *tritona* group which is represented in my collection by *grisea* (= *pudorata*), *tritona* and *falcata*. It differs from any of these by the greater evenness of the t. p. line and the row of black dots at the base of the fringes of primaries. The hind wings are white, allying the moth to *grisea*. Head and collar blackish gray, darker than the gray thorax. Sides of the tegulæ edged with brown. Edge of the thorax behind tipped with black scales; basal abdominal tuft mixed with black. Fore wings smooth dark gray. A fine basal dash to the double inner median line, which has a subcostal tooth and is inwardly bent below median vein, but else is even. Lines and median shade marked by black costal dots. Stigmata concolorous, separate, with faint interior shades, ringed with black; orbicular spherical, reniform of the usual shape. T. p. line even, double, outer line black and thick, very slightly irregular opposite the disc, followed by a faint brown shading, with a black submedian dash crossing subterminal space, but apparently not reaching the margin. Fringes finely interlined at base, gray, whitish at tips with a

distinct series of black dots at base. Hind wings pure white, with a faint and narrow terminal line; fringes white. Beneath grayish white; ornamentation obsolete. Abdomen above whitish gray, below paler. Palpi black at the sides, white beneath.

Expanse 32 mil. *Habitat* Colorado.

SPHINX EREMITUS.

BY THOS. W. FYLES, COWANSVILLE, P. Q.

This species first came under my notice four years ago. I have met with it every year since, have raised it from the larva, and have taken the perfect insect at Honeysuckle. I find a drawing of *S. eremitus* in No. 13 of Strecker's Work on the Lepidoptera, and an account of the larva written by Prof. Snow, of Kansas. The account is as follows:

"Length $3\frac{1}{2}$ inches, greatest thickness .56 in. Head greenish brown with distinct white stripe on each side; general color of body pale green, with seven oblique lateral white bands; caudal horn black and in length .37 in. It becomes full grown from 21st of September to 15th of October; imago appears from May 20th to June 10th. Food plants, *Salvia Pitcheri* Torrey, and *Salvia trichostemmoides* Pursh. The larvæ were first observed by me in October, 1873, in great abundance, and several imagines were obtained from them in the following May and June. The species is double-brooded."

My own account of the larva is this:

Discovered in September, 1874, feeding on *Salvia officinalis*. Sepia-colored—slightly granulated like "shagreen"—having a varnished appearance. Anal horn black, rather small. The first segments (i. e., those to which the pro-legs are attached) horn-colored and semi-transparent, having *two black shield-shaped blotches upon them, of which the hinder is much larger than the former*. Pro-legs black. Transverse side-lines whitish, the hindmost of them broader than any of the others. Spiracles black. Head with two longitudinal whitish lines.

I have seen, I suppose, thirty of the caterpillars, and this description would answer for any one of them. The difference in the body-color of the insects described by Prof. Snow and that of those described by myself, is no greater, perhaps, than I have met with in the case of individuals of *S. quinquemaculata*. But I do wonder that I have never come across any "pale green" specimens, and also that nothing resembling the

shield-like patches, which have been so conspicuous in all the larvæ I have met with, seems to have been noticed by the Professor in the larvæ he describes. The specimens of the perfect insect I have in my cabinet are rather smaller, and much darker, than the representation in Strecker's work.

NOTES ON THREE SPECIES OF XYLOCOPA.

BY W. H. PATTON, WATERBURY, CONN.

XYLOCOPA MICANS Lepel.

X. micans Lepel., Hym. ii., 208, ♂; Smith, Tr. Ent. Soc. Lond. 1874, 297, ♂ ♀.

X. vidua Lepel., Hym. ii., 210, ♀.

X. purpurea Cress., Tr. Am. Ent. Soc., iv., 284, ♀; Smith, Tr. Ent. Soc. Lond., 1874, 299, ♀.

From Mr. L. Heiligbrodt I have received a specimen of *X. purpurea*, and it agrees in all respects with the female of *micans*. Accompanying this was a male, evidently of the same species. It agrees perfectly with Smith's description of *micans* ♂, presenting only a few slight characters not mentioned by him. The length is eleven lines, the sides of the venter are blue, the tibiæ and the basal joint of the tarsi are more or less testaceous beneath, and the intermediate and posterior tibiæ and a part of the basal joint of the posterior tarsi are clothed with fulvous pubescence.

XYLOCOPA VARIPUNCTA, n. sp.

♀. Length 13 lines. Black, with black pubescence; wings dark brown, with brassy and coppery reflections; flagellum beneath, except basal joints, piceous. Clypeus with large sparse punctures, the clypeus limited above by a smooth slightly elevated ridge; a tubercle between the antennæ, a small pit behind each posterior ocellus; base of the mandibles with few punctures and not excavated, labrum with three uneven ridges or tubercles. Disk of mesothorax and scutellum above without punctures, scutellum truncate. Abdomen punctured, the apical margins of the segments and the median line on segments three to five without punctures; the punctures on segments one and two finer and more numerous than those on the following segments.

Arizona. Two specimens (C. V. Riley). Related to the West Indian *X. mordax* Smith.

XYLOCOPA FIMBRIATA Fabr. A female specimen collected in the Yosemite Valley, Cal., by Mr. F. V. McDonald, adds this species to the fauna of the United States.

As I am revising the MSS. of my Synonymical Catalogue of the Heterocera of N. Am., preparatory to its early publication, I would be most thankful if authors of lately described species would send me copies of their papers, or at least give me the names of the works containing their articles, with number of volume, page and date of publication.

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The Canadian Entomologist.

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LONDON, ONT., APRIL, 1879.

No. 4

THE SCIENTIFIC NAMES OF INSECTS.

BY PROF. E. W. CLAYPOLE, B. A., B. SC. (LONDON) ANTIOCH COLL., OHIO.

Every effort to render the present hotch-potch of Entomological names more correct and elegant is welcome to students of the Natural Sciences whose knowledge of the classic tongues is sufficient to render the ear sensitive to the grating jargon of many of our so-called Latin terms. I was therefore pleased to see Mr. Hulst's article in a late number of the CANADIAN ENTOMOLOGIST. He has raised one point that has been little noticed, but well deserves attention.

Having had some experience in the difficulties of scientific terminology, especially when engaged in drawing up a chapter on the subject for Mr. Miller's Catalogue of North American Fossils, I am induced to send a few lines on the subject.

With almost all Mr. Hulst's remarks I fully agree. On one point, however, I think that to follow out the advice given would lead to very great confusion. This would nevertheless be no valid objection were the advice itself beyond all question sound. But the argument supporting it appears to me not so. I refer to the following passage: "A feminine name must not be joined to a masculine noun. It is just the same as saying 'the girl John' to utter such a combination as *Melitaea phaethon*" (not *phaeton*) "or *Danaïs archippus*. We must or ought to write and say *Melitaea phaethona*" (not *phaetona*) "*Danaïs archippa*, and so on through the list."

So long is the list of scientific names that would come under condemnation were the sentence here pronounced carried into effect, that it is worth while to consider if it is absolutely necessary to enforce so stern a decree to the very letter.

The following are only a few specimens picked almost indiscriminately from the docket before the court :

<i>Eudryas unio</i> ,	<i>Vespa crabro</i> ,
<i>Chrysophanus Thoe</i> ,	<i>Thecla Mopsus</i> ,
<i>Attacus mylitta</i> ,	<i>Telea Polyphemus</i> ,
<i>Satyrus nephele</i> ,	<i>Scolopendra heros</i> ,
<i>Morpho Menelaus</i> ,	<i>Cecidomyia destructor</i> ,
“ <i>Polyphemus</i> ,	<i>Chionobas semidea</i> ,
<i>Limenitis Hephaestion</i> ,	<i>Ceratonia Amyntor</i> ,
“ <i>misippus</i> ,	<i>Agrotis devastator</i> ,
&c., &c., &c.	

The beautiful goddess of Mt. Washington and Pike's Peak (*C. semidea*) would seem less beautiful were she to become a demigod (*C. semideus*). Our old enemy the Hessian Fly (*Cecidomyia destructor*) might become less injurious if made feminine (*C. destructrix*). The Hesperians (*H. Wamsutta*, *H. Mystic*, *H. Hobomoc*) may perhaps be held of either gender, being scarcely Latin in any form. We can scarcely afford to dress Agamemnon's brother in female attire and say *Morpho Menelaa*; and *Polyphema* is yet more unendurable either with *Morpho* or with *Telea*. Before committing ourselves to such wholesale changes it is well to consider if the step is compulsory.

(1) It would introduce into scientific nomenclature a great number of nouns not existing in Latin or any other language, and many of them unnecessary.

In addition to those given above, let us notice the example given by Mr. Hulst, *Melitaea phaethon*, which he would make *Melitaea phaethona*. The change proposed would not make the new word Latin, for there is no reason to suppose that the feminine form of *phaethon* would have been *phaethona*. Moreover, so far as termination is concerned the word as it stands might be considered feminine if necessary, the ending *on* being so used in that language, as, for example, in *Gorgon*.

(2) Some of these words are capable of being explained so as to remove the apparent discrepancy in gender. Take for example Mr. Hulst's second instance, *Danaïs archippus*. The specific name being a modern coinage, must be judged according to the analogy of similar terms in Greek. Applying this test, we find that such compounds usually have but one form for both masculine and feminine genders. *Philippus*,

perhaps the closest analogue of *archippus*, is in this condition. We may therefore regard the specific name as of both genders, and say *D. archippus* without offending classic taste.

(3) It is by no means an uncommon practice on the continent of Europe, in the Romance languages, to give feminine names to men, and *vice versa*. Any one can find abundant proof of this assertion by looking over a list of the Spanish nobility. Even the maker of the well-known Eau de Cologne bears the complex name Jean Marie Farina. I do not defend the practice; I only mention its existence.

(4) In the classic tongues and in those derived from them it is almost impossible to avoid the apposition of feminine and masculine nouns in consequence of the arbitrary severance of gender and sex. Eutropius begins his Roman History by applying to the Roman Emperor the title *Vestra Tranquillitas*. A Spaniard is compelled by his language to use the feminine noun when addressing his superior, as "*Vuestra Eminencia*," or even "*Suya Eminencia*" to a Cardinal. And though "Your Majesty" and "Her Majesty" may in classic usage accord with Mr. Hulst's rule when applied to Queen Victoria, they must violate it when applied to a king.

(5) It is quite common to find nouns of different genders put in apposition by classical Latin authors. For examples see the first Georgic of Virgil (ll. 5, 10, 32). In the first quotation all three genders are thus placed. And for a yet more conspicuous example see the first ode of Horace, containing the well-known words: "*Maecenas o et praesidium et dulce decus meum*."

(6) Even among the Romans themselves, and in the construction of their proper names, the practice of mingling together masculine and feminine words was not uncommon. Besides others, perhaps capable of being disputed, we may quote the names of the two Emperors Caius Cæsar *Caligula* Augustus, and Marcus Aurelius Antoninus *Caracalla*. Both these feminine nouns were incorporated into the names unchanged. We need only glance down the list of Consuls to see that the practice was frequent. L. Licinius *Sura* was Consul in 107 A. D.; A. Cornelius *Palma* in 109 A. D., and Q. Ninnius *Hasta* in 114 A. D.

We have therefore abundant classical authority for linking nouns of different genders in apposition in the same name, and may therefore, I think, without offence, save ourselves the trouble of making so many

changes as would otherwise be necessary in our catalogues. On the other hand, I quite agree with Mr. Hulst that such combinations are not desirable, as they create unnecessary difficulty. A cautious author will avoid this as carefully as other dangers in forming a new name, and we must all feel indebted to Mr. Hulst for having called attention to this little noticed source of error and dispute, that it may be avoided in the future.

DESCRIPTIONS OF SEVERAL NEW PROCTOTRUPIDÆ AND CHRYSIDIDÆ.

BY W. H. PATTON, WATERBURY, CONN.

PROCTOTRUPES CRENULATUS.

♀.—Length of body 10 m. m. Red; eyes, ocelli, antennæ (except basal joint), sides and apical margin of scutellum, the post-scutellum, metathorax, extreme base of abdomen and tip of ovipositor, black; mesopleura, disk of mesopectus and spiracles of metathorax, piceous; terminal joints of the tarsi fuscous. Clothed with a short pale pubescence, the abdomen, except the base and a ventral line, glabrous. Antennæ 13-jointed, the basal joint robust, partially concealing the second joint, which is minute; joints 3-13 slender. Prothorax and mesothorax with fine striations on the pleura, the mesopleura with a smooth convex area; the depression on each side of the scutellum with six distinct ridges, its depressed posterior border with short ridges. Post-scutellum depressed at the sides, rugose, separated from the metathorax by a distinct cleft. Metathorax elongate, evenly rounded, traversed by a median longitudinal ridge, on each side of which are oblique wavy ridges forming irregular reticulations, on the sides these reticulations becoming more uniform and anteriorly becoming finer. Wings yellowish-hyaline, costal nervures and stigma piceous, the other nervures testaceous; no recurrent nervure present, radial cell very small, transverse, first cubital cell closed, large, a bulla at its tip on the cubital nervure. Trochanters formed of only one distinct joint. Extreme base of the abdomen with distinct ridges; the remainder of the abdomen highly polished and smooth. Ovipositor as long as the abdomen.

One specimen. Connecticut, Oct. 17th.

In size and in the venation of the wings this species agrees with Say's description of *P. caudatus*. But Say's species is "pale testaceous," has a "blackish transverse line between the antennæ," and is not stated to have the metathorax black.

GONATOPUS CONTORTULUS.

Length 3.5 m. m. Head testaceous, mandibles and scape of the antennæ white; the teeth of the mandibles, second joint of the antennæ and a line on the scape posteriorly, pale testaceous, remainder of antennæ fuscous. A large fuscous spot on the under side of head and another above in front of and including the ocelli; a raised line extending forwards from anterior ocellus to the face. Head transverse, broader than thorax or abdomen; convex beneath, concave behind, above and in front; the mouth prominent; the eyes longitudinally ovate, prominent, not reaching the posterior border of the head. Antennæ 10-jointed, the basal joint stout, the second joint more slender and one-half as long as the first, the third very slender and equal in length to the first and second together, the fourth and following joints slender but gradually becoming thicker, the fourth one-half as long as the third, the fifth a little shorter than the fourth and a little longer than each of the following joints. Thorax and abdomen piceous-black. The thorax slender, binodose. The trochanters formed of only one joint. Anterior coxæ long and robust, pale testaceous with a darker stripe above; anterior trochanters whitish, more slender, clavate; femora large obclavate, dark testaceous, paler at tip; tibiæ as long as the femora, and, together with the first tarsal joint, pale testaceous; terminal joints of the tarsi and the chelæ whitish. The chelæ at rest extending back to the tip of the first joint of the tarsus, the outer claw pointed and slightly curved at the extremity, the inner claw more robust, ciliated internally and with a wrench-shaped curve at the extremity (as in fig. 13); pulvillus tipped with fuscous. The other legs slender, the coxæ and the base of femora dilated; testaceous, the coxæ, base of femora, tibiæ above and claw joint of tarsi darker. Abdomen ovate, pointed at tip and with a short petiole.

Fig. 13.

One specimen. Waterbury, Conn.; taken on herbage a few inches above the ground, Aug. 18th.

This is the first species of the genus discovered in America, the *Gonatopus? alatus* Cress. (Tr. Am. Ent. Soc., iv., 193) evidently belonging to the genus *Dryinus* of Walker and Haliday.

CLEPTES ALIENA.

♀.—Length 6 m. m. Blue-green, the blue tinge more pronounced upon the median thoracic piece and the second and third segments of the abdomen; the head golden in front, the flagellum and the tibiæ within blackish, the tarsi fuscous. Thinly clothed with erect black hairs, the disk of the three basal segments of the abdomen glabrous. Wings subhyaline, the principal nervures black. The pointed tip of the abdomen piceous, with a golden reflection; the abdomen polished, very delicately punctured. Metathoracic spines moderate, sharp. Discoidal cell complete, appendiculated, the tip of the appendiculation connected with the base of the stigma by a bullar streak, cubital vein beyond the bulla distinct; radial cell closed indistinctly. Head finely punctured; thorax strongly punctured, disk of mesothorax and scutellum polished and sparsely punctured, metathorax reticulated, the upper surface with seven longitudinal carinæ.

Como, Wyoming; S. W. Williston. This is the first species of the genus recorded from North America.

NOTOZUS MARGINATUS.

Length 5 m. m.; expanse 8.5 m. m. Dark green with blue and violet reflections; face, vertex of head posteriorly and about ocelli and the disk of the mesothorax with a violet reflection; antennæ black, a slight bluish reflection on scape; mandibles beyond the middle pale testaceous, tridentate at tip, the teeth piceous; tarsi dull fulvous; wings pale fuscous, hyaline towards the base, nervures and tegulæ piceous; posterior face of the thorax and the second segment of the abdomen, particularly at the base, strongly tinged with blue; truncation of the third segment black; body beneath light green. Head with dense but shallow punctures, face excavated, delicately aciculated, posterior borders of head sharp. Anterior femora angulated beneath; the punctures of pro- and mesothorax sparse upon the disk; the punctures on scutellum and metathorax large; spine on post-scutellum flat, blunt and covered with large discoidal punctures; lateral angles of metathorax sharp. Abdomen very delicately and densely punctured, the punctures exceedingly fine on the disk of the first and second segments. Apical segment compressed towards the tip, subcarinate above, truncate at the extremity, the sides bisinuate, margined by a distinct row of large punctures; the truncation with no punctures

excepting a faintly impressed series just within the delicate raised bounding line ; an arc of 120° removed from the truncated disk by an emargination which does not reach the centre.

Waterbury, Conn., July 27th.

Slightly larger than *Notozus viridis* (*Elampus viridis* Cress., Proc. Ent. Soc. Phila., iv., 103 ; Cuba), and differs in the form of the apex of the abdomen.

CHRYYSIS VERTICALIS.

Green and dark purple, minute, slender, discal cell obsolete, apex of abdomen truncate ; length 4 m. m.

Head and thorax green ; flagellum fuscous, a purple spot about ocelli, palpi and tips of the mandibles testaceous, median piece of mesothorax purple, post-scutellum tinged with purple, tarsi white, wings hyaline, outer border of the tegulæ and the nervures dark piceous. Abdomen dark purple, extreme base of the first segment and sides of the first and second segments green, apical margins of the first and second segments and a fascia before the foveolæ and on sides of the third segment blue-green. Body beneath light green. Body clothed with white pubescence. Confluently punctured, the punctures on the abdomen finer and distinct. Head unusually long, the front being very convex, the vertex unusually convex when viewed from before, the eyes prominent and suborbicular, the transverse ridge between the eyes and above the antennary fossa prominent. Prothorax without median groove, grooves of mesothorax distinct ; post-scutellum distinct from the metathorax, elevated, but not produced into a spine ; metathoracic spines sharp, parallel ; discoidal cell of anterior wings obsolete, the radial and sub-medial cells as usual. Abdomen with the median sulcus on the basal segment distinct, the third segment narrowed towards the apex, which is truncate and unarmed ; the ante-apical series of foveolæ, consisting of a few large confluent punctures, interrupted in the middle.

Waterbury, Conn., July 22nd ; found entangled in a spider's web.

The form of the head in this species is peculiar.

CHRYYSIS MARTIA.

Green, abdomen red, wings hyaline ; length 5 m. m.

Head and thorax green, with a thin griseous pubescence ; antennæ black, the basal joints of the flagellum above and the scape green, the

latter tinged with coppery in front, ocelli enclosed in a blue spot : wings hyaline, the tegulae and nervures piceous ; anterior tarsi and tips of the posterior tarsi blackish, the four posterior tarsi mostly pale testaceous. Abdomen dark red, with green and purple reflections, the base of the first segment golden-green, venter green with deep red reflections. Head and thorax densely and strongly punctured ; the depression above the antennae well marked, polished ; front and vertex convex, no transverse ridge between the eyes. Prothorax with a median groove, four distinct grooves on the mesoscutum ; post scutellum and metathorax evenly rounded above. Abdomen densely punctured, the punctures finer than those of the thorax, the median line on the second segment distinct, the series of foveolae on the third segment consisting of twelve deep punctures, the median punctures the largest ; second and third segments of equal length, the third segment suddenly narrowed a little beyond the foveolae and produced in the centre, the tip truncate, of more than one-third the width of the segment, not dentate.

Godbout River, Lower Canada ; Wm. Couper.

This is the first discovered North American species to which the name "ruby-tail" properly applies.

COLLECTING ABOUT CHICAGO IN 1878.

BY C. E. WORTHINGTON, CHICAGO, ILL.

The early appearance of Lepidoptera gave indication of an unusually good season for field work, but the cold and wet weather in May and June apparently depopulated the woods and fields. Papilios were rare, and the Argynnidæ that usually fly in clouds above the prairies were conspicuous by their absence. The number of species taken was not much reduced, but my notes show a less number of examples in proportion to the time given to their pursuit than in any previous season.

My first capture for the year was an example of *Xylina Bethunei* G. & R., on March 11th, fresh from pupa. March 12th, *Phigalia strigataria* and *Taeniocampa incerta* ; thereafter until May 5th, various species

continued to appear until checked by the cold following that date ; comparatively few specimens were obtained until after August 15th.

I have followed Mr. Grote's Check List closely in the following list of Noctuidæ taken. In the majority of cases these were taken at sugar, the main exceptions being *Cucullias* and *Plusias*.

In this connection I desire to express my obligations to Mr. Lintner and Prof. Grote, who have aided me much.

Squirrels and mice were troublesome at times about the trees, and later in the season timber wolves and some other representatives of the best suburban society, names unknown, were attracted, perhaps more by the operators than the sugar, but at any rate requiring more attention than was compatible with the successful pursuit of Entomology.

<i>Pseudothyatira cymatophoroides</i> ,	<i>Agrotis baja</i> , S. V.	July
Guen.	" <i>haruspica</i> , Grote.	"
<i>Pseudothyatira expultrix</i> , Guen. "	" <i>c-nigrum</i> , Linn.	March-Nov
<i>Habrosyne scripta</i> , Gosse. . . . "	" <i>bicarnea</i> , Guen.	July
<i>Raphia abrupta</i> , Grote.	" <i>subgothica</i> , Haw.	July-Sept
" <i>frater</i> , Grote.	" <i>tricolor</i> , Lint.	Aug
<i>Harrissimemna sexguttata</i> , Harris	" <i>herilis</i> , Grote.	July-Aug
.	" <i>plecta</i> , Linn.	June
<i>Apatela occidentalis</i> , G. & R. . . .	" <i>redimicula</i> , Morr.	"
" <i>morula</i> , G. & R.	" <i>pitychrous</i> , Grote.	July
" <i>lobeliæ</i> , Guen.	" <i>scandens</i> , Riley.	Aug
" <i>furcifera</i> , Guen.	" <i>fumalis</i> , Grote.	"
" <i>lepusculina</i> , Guen.	" <i>messoria</i> , Harr.	July
" <i>Americana</i> , Harr.	" <i>velleripennis</i> , Grote. . . .	"
" <i>ovata</i> , Grote.	" <i>venerabilis</i> , Walk.	"
" <i>hamamelis</i> , Guen.	" <i>ypsilon</i> , Rutt.	March-Nov
" <i>vinnula</i> , Grote.	" <i>saucia</i> , Hüb.	"
" (<i>Eulonche</i>) <i>oblinita</i> , Sm.-	" <i>clandestina</i> , Harr.	"
Abb.	" <i>brunneicollis</i> , Grote. . . .	July
<i>Jaspidea lepidula</i> , Grote.	" <i>alternata</i> , Grote.	Aug
<i>Microcoelia diphteroides</i> , Guen. "	" <i>cupida</i> , Grote.	"
" " var. <i>obliter-</i>	" (<i>Eurois</i>) <i>prasina</i> , S-V. . . .	"
<i>ata</i> , Grote.	" <i>occulta</i> , Hüb.	"
<i>Agrotis sigmoides</i> , Guen.	<i>Mamestra latex</i> , Guen.	June
" <i>perattenta</i> , Grote.	" <i>adjuncta</i> , Guen.	"

Mamestra grandis, Boisd June	Euplexia lucipara, Linn June
“ subjuncta, G. & R. . . . “	Brotolomia iris, Guen “
“ distincta, Hüb “	Nephelodes violans, Guen Aug
“ legitima, Grote May	“ minians, Guen “
“ lilacina, Harvey “	Tricholita semiaperta, Morr . . July
“ trifolii, Esper Aug	Helotropha reniformis, Grote . . Aug
“ detracta, Walk June	“ atra, Grote “
“ lorea, H. S. “	Gortyna sera, G. & R. “
“ renigera, Steph. . May-Sept	“ nictitans, Bkh. “
Dianthoecia meditata, Grote . . June	“ inquaesita, G. & R. “
“ capsularis, Guen “	“ immanis, Guen “
“ lustralis, Grote Aug	“ nitela, Guen “
Hadena delicata, Grote Sept	“ nebris, Guen “
“ devastatrix, Brace . . June-	“ cerussata, Grote “
Sept.	Achatodes zeae, Harr “
“ sputatrix, Grote . . June-Sept	Arzama obliquata, G. & R. . . . May
“ apamiformis, Guen Aug	Nonagria sp. ? Aug
“ arctica, Boisd . . June-Sept	Heliophila pallens, L. . . . June-Sept
“ vulgivaga, Morr Aug	“ Harveyi, Grote “
“ lignicolor, Guen “	“ phragmitidicola, Guen. “
“ vulgaris, G. & R. “	“ adonea, Grote Aug
“ cariosa, Guen June	“ commoides, Guen. June-Sept
“ mactata, Guen July	“ unipuncta, Haw. . . May-Oct
“ modica, Guen June	“ pseudargyria, Guen “
“ fractilinea, Grote “	Caradrina miranda, Grote Aug
“ (Oligia) versicolor, Grote “	Pyrophila pyramidoides, Guen.
Perigea xanthioides, Guen Sept	“ June-Aug
“ falrefacta, Morr “	“ glabella, Morr Aug
Dipterygia scabriuscula, Linn. June	Orthodes infirma, Guen June
Hyppa xylinoides, Guen “	“ cynica, Guen “
Callopietria mollissima, Walk. “	Graphiphora incerta, Hufn. May-June
Laphygma frugiperda, Sm-Abb	“ oviduca, Guen June
“ frugiperda, var. obscura,	Ceramica picta, Harr “
Riley Sept-Oct	Parastichtis gentilis, Grote Aug
Prodenia commelinæ, Sm-Abb. Oct	Calymnia orina, Guen July
“ flavimedia, Harvey “	Ipomorpha pleonectusa, Grote “
“ lineatella, Harvey “	Orthosia helva, Grote Aug
	“ ferruginoides, Guen. Sep-Nov

<i>Glaea inulta</i> , Grote Oct	<i>Pyrrhia exprimens</i> , Walk. . Aug-Sep
<i>Eucirroedia pampina</i> , Guen "	" <i>angulata</i> , Grote Aug
<i>Xanthia togata</i> , Esper "	<i>Tarache candefacta</i> , Hüb June
<i>Scopelosoma Walkeri</i> , Grote "	" <i>erastroides</i> , Guen "
<i>Scoliopteryx libatrix</i> , L . . . June-Oct	<i>Eustrotia synochitis</i> , G. & R "
<i>Lithophane Bethunei</i> , G. and R. May-Oct	" <i>carneola</i> , Guen "
" <i>laticinerea</i> , Grote Oct	" <i>apicosa</i> , Guen "
<i>Anytus sculptus</i> , Grote Sept	" <i>muscosa</i> , Guen "
<i>Calocampa nupera</i> , Lint "	<i>Lithacodia bellicula</i> , Hüb "
<i>Lithomia germana</i> , Morr "	<i>Galgula subpartita</i> , Guen "
<i>Cucullia asteroides</i> , Guen "	" <i>hepara</i> , Guen "
" <i>intermedia</i> , Speyer "	<i>Drasteria erectea</i> , Cram. . May-Oct
<i>Adisophanes miscellus</i> , Grote . . . June	<i>Euclidean cuspidea</i> , Hub "
<i>Crambodes talidiformis</i> , Guen. "	<i>Stictoptera divaricata</i> , Grote . Sep-Oct
<i>Nolaphana malana</i> , Fitch "	<i>Parthenos nubilis</i> , Hüb June
" <i>Zelleri</i> , Grote "	<i>Catocala epione</i> , Drury "
<i>Aletia argillacea</i> , Hüb Sept-Oct	" <i>desperata</i> , Guen Sept
<i>Ingura abrostoloides</i> , Guen June	" <i>retracta</i> , Grote Aug
<i>Calpe Canadensis</i> , Beth Aug	" <i>insolabilis</i> , Guen . . . June-Sep
<i>Plusiodonta compressipalpis</i> , Guen. Aug	" <i>Levettei</i> , Grote July
<i>Telesilla cinereola</i> , Guen June	" <i>obscura</i> , Streck Aug
<i>Plusia aerea</i> , Hüb Aug-Oct	" <i>relicta</i> , Walk "
" <i>contexta</i> , Grote "	" <i>unijuga</i> , Walk "
" <i>biloba</i> , Steph. . May-Aug-Oct	" <i>briseis</i> , Edw "
" <i>verruca</i> , Fab Sept	" <i>concombens</i> , Walk "
" <i>dyaus</i> , Grote Sept-Oct	" <i>amatrix</i> , Hüb Sept
" <i>precationis</i> , Guen . . . June-Oct	" <i>cara</i> , Guen Aug
" <i>ou</i> , Guen Sept-Oct	" <i>coccinata</i> , Grote June
" <i>brassicae</i> , Riley "	" <i>ultronia</i> , Guen "
" <i>oxygramma</i> , Geyer "	" <i>parta</i> , " Sept
" <i>simplex</i> , Guen June-Oct	" <i>ilia</i> , " Aug
<i>Chloridea Rhexiae</i> , Sm.-Abb . . . Oct	" <i>innubens</i> , " "
<i>Heliothis phlogophagus</i> , G. & R. Sept	" <i>cerogama</i> , " "
" <i>luteitinctus</i> , Grote "	" <i>neogama</i> , " "
" <i>armiger</i> , Hüb "	" <i>subnata</i> , Grote "
<i>Heliochilus paradoxus</i> , Grote "	" <i>piatrix</i> , " "
	" <i>palaeogama</i> , Guen "
	" <i>habilis</i> , Grote "

Catocala Clintonii, " Aug	Homoptera lunata, Drury.. May-Oct
" polygama, Guen. . . . July	Ypsia undularis, Drury. . . . Aug
" crataegi, Saund. "	" aeruginosa "
" grynea, Cram. Aug	Homopyralis tactus, Grote. . . . June
" fratercula, G. and R. . July	Pseudoglossa lubricalis, Geyer—
" gracilis, Edw. " June-Oct
" amica, Hüb. "	Epixeuxis aemula, Hüb. . . . "
" lineella, Grote. "	" Americalis, Guen " "
Panopoda rufimargo, Hüb. . . . "	Chytolita morbidalis, " . June
" carneicosta, Guen. . . . "	Zanclognatha laevigata, Grote " "
Remigia hexastylus, Harvey. . Sept	Renia Belfragei, Grote. "
" latipes, Guen. Oct	" larvalis, " "
Celiptera frustulum, Guen. . . . June	Bleptina caradrinalis, Guen. . . "
Parallelia bistriaria, Hüb. "	Bomolocha abalienalis, Walk. " "
Erebus odora, Linn. Aug	" (Euhypena) toreuta, Grote " "
Zale horrida, Hüb. June	" (Macrhyphen) profecta " "
Pheocyma lunifera, Hüb. "	" " deceptalis, Walk " "
Homoptera edusa, Drury. May-Oct	" " perangularis, H'y " "
" Saundersii, Beth " "	Plathypena scabra, Fab. . June-Sept

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KY.

Lithocolletis Scudderella F. & B.

Knowing this species only by Prof. Frey's description, I have in previous notices treated it as identical with *L. salicifoliella* Cham. But among the specimens submitted to me by Dr. Hagen is one of Prof. Frey's *Scudderella*, and being thus enabled to compare it with *salicifoliella*, I find that they are sufficiently distinct.

Scudderella is larger than *salicifoliella*, and has the tuft on the vertex darker. The ground color of the thorax and fore wings is not very different in the two species, but *salicifoliella* usually has the fore wings densely dusted with brown. This character can not, however, be relied on to distinguish the species, for the dusting is frequently almost or entirely

wanting. But on the basal part of the costal margin *salicifoliella* has a white streak, and just behind it another which meets an opposite dorsal streak so as to form an angulated fascia; and this streak and fascia are absent in *Scudderella*. The other costal streaks are similar in the two species, except that in *salicifoliella* the last two, placed just before the apex, usually cross the wing, becoming fascia. There are other differences, but those here indicated are sufficient for the ready distinction of the species.

L. deceptusella, n. sp.

Among my captured specimens of *L. cratægella* Clem. I find a specimen of this species which at the time of its capture I regarded only as a variety, but which a more attentive examination convinces me is a distinct though allied species. The abdomen and two hinder pair of legs are wanting, though otherwise the insect is in good condition, and though there is but a single specimen, I describe it for the purpose of discriminating it from *cratægella*.

Head, antennæ and palpi silvery white, tuft white mixed with saffron, much paler than in *cratægella*. Thorax and fore wings very pale golden brown—much paler than *cratægella*, perhaps more properly described as dark reddish saffron. On the fore wings there are four silvery white costal streaks like those of *cratægella* in shape and position, but smaller and not so distinctly dark margined; the first is about the middle of the wing length, and is dark margined on both sides; the second is behind it and is dark margined only before, as also on the other two, which are in the apical part of the wing. The dark margin of the first streak is continued along the extreme costa to the base. There is a short and narrow white streak on the base of the dorsal margin and a median basal silvery white unmarginéd basal streak which extends nearly to the middle of the wing. (In *cratægella* this streak is dark margined on both sides and around its apex.) Nearly opposite to, but a little before the first costal streak, is a nearly square large dorsal silvery white spot, which extends to and becomes confluent with the median basal streak just before the apex of the latter. It is directed a little obliquely backwards and is not at all (or but very faintly?) dark margined; opposite to the second costal streak is a triangular silvery white dorsal spot, larger than the costal spot and almost an equilateral triangle. The first of these dorsal spots—the one which extends to and is confluent with the median basal streak—is in

cratægella, and in *L. Hageni* F. & B., represented by a long dorsal streak placed immediately behind the apex of the median basal streak, and curving to a point near the middle of the wing, dark margined, and not confluent with the basal streak. This is the most striking difference between the species except in size (*L. Hageni* is larger than *L. cratægella*, which is larger than this species). In the apical part of the wing is a median dark brown streak extending to the apex. In *cratægella* this streak is much longer, beginning at the first costal streak and connected with the dark margin of all the streaks; in this species it begins behind the second costal streak; and in *Hageni* it is represented only by a small circular apical spot. Ciliæ white with a dark brown hinder marginal line at their base; in this respect it resembles *cratægella*, while *Hageni* has the tips of the costal ciliæ brown and a distinct brown "hook" radiating from the apex through the ciliæ. In this species and in *cratægella* the space at the base of the wing between the median and the dorsal basal streaks is of the general color, except that the color gradually deepens towards the apex, while in *Hageni* the whole dorsal half of the base of the wing is white, so that there is no distinction between the median and dorsal basal streaks; the white, however, extends farther along the middle of the wing than it does along the dorsal margin. Hind wings in this species pale silvery gray, with ciliæ of nearly the same hue. Fore legs white with the tibiæ and tarsi marked on their anterior surfaces with reddish saffron. The fourth dorsal streak is small in this species and in *cratægella*; indeed, in the latter it is sometimes obsolete. It is distinct in *Hageni*, and I am not sure but that a fifth is also there indicated by its small dark margin. This species is nearer to *cratægella* than either is to *Hageni*. The larva of *cratægella* feeds on *Cratægus* and allied genera; that of *Hageni*, according to Prof. Frey, on Oak, and from the locality in which I took the single specimen of this species I suspect that it also feeds on Oak.

Gracilaria purpuriella Cham.

This species was originally described from a few bred specimens and seemed to be distinct from the European *G. stigmatella*. But a larger collection induces me to believe that on a comparison of specimens they will be found to be the same species.

LYONETIA:

Four species of this genus have been described in this country—one,

L. speculella, by Dr. Clemens, and three, *L. alniella*, *L. apicistrigella* and *L. gracilella*, by me. Of these *speculella* and *alniella* are certainly distinct species, and so the others appear to me to be. But considering the amount of variation which is found so commonly in the extent and intensity of the fuscous markings of the known species of the genus, and the fact that two or more of the fuscous marks may by spreading and confluence unite into a larger patch, or may surround a white spot, or may be connected by streaks, etc., it is not impossible that *L. apicistrigella* may prove to be a variety of *speculella* or of *gracilella*, or even all three may prove to be varieties of one species. The truth about this can only be satisfactorily determined by breeding them from the larva, and as yet *alniella*, of Colorado, is the only species the larva of which is known. In the description of that species I alluded to the range of variation in its ornamentation. I have taken in Kentucky two specimens which I incline to refer to *apicistrigella*, though they differ somewhat from the typical specimens, having the whole fore wings pale fuscous and the markings only deeper than the remainder of the wings; but even these deeper markings do not agree accurately with those of typical specimens of the species. I have now before me a specimen which I feel bound to refer to *L. speculella* Clem., though not agreeing at all accurately with it; and I have also before me a specimen which I refer to *gracilella*, though it differs from it to about the same extent that the other specimen differs from *speculella*. This specimen (of *gracilella*), indeed, seems only to differ from *Lithocolletis nidificausella* Packard (Guide, plate 8, figs. 19 and 19a) by the absence of the spots and shading on the basal half of the dorsal margin of the fore wings, and such a difference in this genus would not be of specific value. The figures above referred to leave no doubt that *nidificausella* is properly referable to *Lyonetia* instead of *Lithocolletis*. The mode of pupation there indicated is that of all the known species of *Lyonetia*, and not of any species of *Lithocolletis*.

It may be proper to add that the figure 15c *loc. cit.*, given as representing the mine of *Lithocolletis geminatella*, is not like any of the multitude of known *Lithocolletis* mines, and may possibly be that of a *Lyonetia*, but is much more probably that of a *Nepticula*.

Should *gracilella* prove on breeding it to be identical with *nidificausella*, the latter name has priority.

SOME NEW SPECIES OF NOCTUIDÆ.

BY G. H. FRENCH, CARBONDALE, ILL.

Dicopis vitis, n. s.

Imago.—Length .50 of an inch. Expanse of wings 1.35 inches. Head, prothorax and thorax gray, the second tipped a little with light and containing a fine dark line. Abdomen yellowish gray. Color of primaries below a line running from the outside of the basal line on the costa to near the hind angle, light gray; above this line dark gray, with a slight smoky tinge. The stigmata, a space along the costa in front of the stigmata, the apical space and the subterminal space one-third of the distance from costa to hind margin, the same light gray as the hind or inner part of wing, mottled a little with smoky spots. Basal line obsolete except on the costa. T. a. line black, double, the inner part very faint, strongly but regularly arcuated, the end of claviform connected with it outwardly; from this a brown dash runs to the t. p. line. Transverse shade scarcely visible. T. p. line faint, nearly parallel with the outer margin. Subterminal line scarcely distinguishable save by the dark brown in the terminal space. The brown is in the form of shaded points in the middle that run to the outer margin. Outer margin light gray. Fringe dark gray interrupted with white at the ends of the veins. Secondaries grayish white with a blackish outer border.

Larva.—Length when fully grown 1.25 inches. Ground color green, marked as follows with greenish white: very faint dorsal line bordered each side with a darker shade of green, subdorsal line distinct, stigmatal faint, neither of these bordered with darker green. Besides these lines, the body is irregularly mottled with small spots of the same greenish white color. Head a little smaller than the other segments, of a nearly uniform green.

The chrysalis is subterranean; the anal end tipped with four bristles, two rather stout, the other two about half as long as the first two and more slender. The larva was found on a grape vine, upon the leaves of which it fed while in confinement. It is single brooded, pupating the last of June and producing the imago in the following March.

Described from one ♀.

Orthosia signata, n. s.

Length .70 of an inch. Expanse of wings 1.50 inches. Color of head, prothorax and thorax rich cinnamon brown; the abdomen the same

with a slight rose tint to the long hairs on the basal segments, and a slight ochre tint on the posterior part of each segment, the terminal brush a dark brownish ochre. Under side of the body the same as the upper, the long hairs having the rosy tint. *Primaries* the same color as the thorax, marked with darker shades of brown, with a few lighter scales on the veins and a few black scales scattered over different parts of the surface. Basal, t. a. and t. p. lines moderately distinct, double, composed of brown and black scales, in which the black predominates, the included space a little lighter than the ground color; the t. p. line strongly arcuated beyond the reniform. Transverse shade prominent below the median vein and near the costa. Subterminal line light, running nearly parallel with the outer margin, bordered on its inner side with a dark brown that shades out towards the t. p. line. Between the subterminal line and the outer border is the lightest part of the wing. Orbicular and reniform annulated with slightly lighter brown than the ground color, the first somewhat kidney-shaped, the last with a prominent black spot in its lower part. *Secondaries* blackish brown, not very dark, scarcely lighter at the base. Fringes dark reddish brown with a narrow ochreous stripe at the base. Under side a little lighter than above, with a distinct black arcuated line marking the outer third of both wings.

Described from one ♀.

Heliothis Illinoensis, n. s.

Length .45 of an inch. Expanse of wings 1.10 inches. Color of head and thorax reddish brown, the dorsal portion of each having a yellowish cast. The abdomen rather dark nankeen yellow. Under side of body a mixture of yellow and reddish brown. *Primaries* reddish brown, being rather more of a red than a brown, with patches of dark ochre scales between the stigmata, the reniform and the t. p. line, and below the median vein. Basal, t. a. and t. p. lines black, single, the t. a. line with a strong outward angle just before reaching the hind margin, the t. p. line angulated about the same as in other species of the genus. Transverse shade distinct only near the costa and hind margin. Subterminal line broken into about nine black spots without shading. The annulations of the stigmata indistinct, these spots chiefly marked by a few enclosed black scales, portions of the black annulus being seen in places. At the base of the wing, on the hind margin, is a small patch of yellow scales similar

in color to the dorsum of the abdomen. *Secondaries* the same ground color as the fore wings, rather bright, scarcely lighter at base, with an indistinct, blackish, subterminal band, partially interrupted in the middle; under side of wings paler than above, with an arcuated black line marking the outer third of the wings, not distinct on the secondaries, and a black discal dot.

Described from one ♀ taken in Union Co., Illinois.

OBITUARY.

Another veteran in the Entomological ranks has passed to his rest. Frederick Smith, the renowned English Hymenopterist, is no more; he died on the 16th of February, in the 74th year of his age, from exhaustion consequent on a painful and dangerous surgical operation. He was born in London, England, in 1805, and in early life was apprenticed to Mr. W. B. Cooke, an eminent landscape engraver, where he acquired a very thorough knowledge of the engraver's art, which was of great use to him in after life. While still a young man he became an ardent collector of bees and ants, and also devoted some attention to the collecting of Coleoptera; but it was not until 1837 that the first paper from his pen was published, giving an account of the natural history of one of the Gall Flies. From 1842 to the time of his death his publications were very numerous and of great value. A most industrious man, a painstaking and methodical student, and an accurate observer, he has done very much to advance our knowledge of the Order in which he especially labored. By his death Entomology loses a sincere and talented advocate and an earnest votary, and Entomologists will greatly miss a friend who was ever ready to impart his knowledge to others.

CORRESPONDENCE.

DEAR SIR,—

To my list of food plants of *Saturnia io* (CAN. ENT., vol. ix., p. 180) I now add the Black Alder (*Prinos verticillatus* L.) and two species of *Rubus* (*R. villosus* Ait., and *Canadensis* L.)

L. W. GOODELL, Amherst, Mass.

DEAR SIR,—

In recording an article of mine on Jacob Hübner and his works, published in the CANADIAN ENTOMOLOGIST, the Editor of the Bibliographical Record of *Psyche* criticizes the paper very briefly by saying that my article proposed to "settle" the matter, but that I did not meet the principal points of my opponents. My paper did not aim to settle the position of Jacob Hübner in entomological literature at all. That must be left to time. What I tried to "settle," and hope I succeeded in doing, was that Dr. Hagen and Mr. W. H. Edwards, in the last named author's criticisms, had given the date of Ochsenheimer's volume incorrectly, had misrepresented Ochsenheimer by introducing a full stop in the middle of one of his sentences, and in appealing to Ochsenheimer as a rejection of the Tentamen failed to improve their position, for Ochsenheimer *adopted* genera from the Tentamen, such as *Agrotis*, etc. I think it quite clear that, whatever be the ultimate fate of Hübner's works, it will never do to read him out of entomological literature on account of his alleged ill success with the men of his time, or in such a manner as Mr. Edwards has attempted, or by such erroneous statements. For one I should be glad of a settlement in the matter, but it can never be arrived at in the manner in which it has been attempted by Mr. Edwards and Mr. Strecker. I have fully replied, I think, to their attack in my article aforesaid and in the preface to my Check List of N. Am. Noctuidæ.

But, in any case, I write now to object to the interjectional criticisms in the Bibliographical Record of *Psyche*, rather than to re-open the matter of Hübner's Tentamen and Verzeichniss. It seems to me that such criticisms are entirely out of place in a Bibliographical Record, and their continuance will seriously impair its value and usefulness. One does not look for criticisms in such a place, and, finding them, their impartiality becomes at once suspected. In the present case the criticism is essentially hasty and bad, but, if my friendly advice to avoid such matters in future be taken, I think it will not prove entirely unfortunate for the publishers of *Psyche*.

Respectfully,

A. R. GROTE, Buffalo, N. Y.

DEAR SIR,—

As I did not have the opportunity to correct the proofs of last half of my paper in March No., will you allow me to call attention here to some

errors in printing? On p. 54, 5th and 4th line from bottom, read :—
 “ Besides that *Zerene* and *Monticola* are either one species or stand together in a natural series, *purpurascens* is *Zerene* of Behr (*Hydaspe* Bois.).”

On p. 55, erase the reference to Vol. 1, But. N. A., on 22nd line, and insert it at the close of the paper, page 56, after *purpurascens*. The last clause will then read :—

128. ZERENE, Bois., 1852.

Var. HYDASPE, Bois., 1869.

Zerene Behr, 1862.

purpurascens H. Edw., 1876.

Zerene var., Edw., But. N. A., Vol. 1, pl. 32.

Yours truly,

W. H. EDWARDS, Coalburgh, W. Va.

DEAR SIR;—

With infinite mortification, I find that in my article in No. 2 of this volume I committed a blunder bad enough to be considered a crime. Will you permit me to apologise to you, and correct myself? *Papilio brevicauda* is excellent Latin. *Papilio brevicaudus*, which I would have substituted, is a barbarism. I ask such as may have noticed the ludicrous error to take the spirit of what was written and pass by the illustration. The barbarism is itself an apt illustration that something more than an amateur knowledge of a language is necessary in one who would criticise.

None the less, however, is the principle I urge the true one and a necessity.

Very truly yours,

GEO. D. HULST,

Beresford, Volusia Co., Fla., April 8, 1879.

DEAR SIR,—

I beg leave to protest against the publication of such names as appear in Mr. Whitney's recent paper on Tabanidæ. I, for one, will never accept the description of insects baptised with such names as *cuclux*, *nigribimbo* and the rest.

Very truly yours,

EDWARD BURGESS, Boston, Mass.

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The Canadian Entomologist.

VOL. XI.

LONDON, ONT., MAY, 1879.

No. 5

DESCRIPTIONS OF NEW SPECIES OF NORTH AMERICAN BUTTERFLIES; ALSO, NOTES UPON CERTAIN SPECIES.

BY W. H. EDWARDS, COALBURGH, W. VA.

ARGYNNIS HIPPOLYTA.

Male.—Expands 2 inches.

Upper side fulvous, obscured by brown at bases of wings; the discal area of each wing lighter than elsewhere; the black markings rather heavy; the marginal lines more or less confluent; the silver spots of second row indicated on upper side by oblong spots of a pale color.

Under side of primaries pale orange-fulvous at base, and in the P-shaped spot of cell; also along the branches of median; rest of wing pale buff, except hind margin and apical area, which are ferruginous; on the sub-apical patch two silver spots, and the four or five uppermost sub-marginal spots are silvered.

Secondaries deep ferruginous, very little mottled with buff; hind margin same hue as the disk; the belt narrow, buff, much dusted with ferruginous; all the spots well silvered; those of outer row small narrow crescents, with heavy ferruginous edging to upper side; the spots of 2nd and 3rd rows small, each edged on upper side by a few scales of black; a round spot in black ring in cell, an oval in ring below cell; shoulder and inner margin silvered.

Female.—Expands 2.25 inch.

More obscured at base, otherwise like male; the basal area of primaries beneath red-fulvous; secondaries as in male, but the belt is almost lost in ferruginous.

From 3 ♂ 1 ♀ received from Mr. G. M. Dodge, and taken in Oregon, but in what exact locality is not known. Another male was received from Mr. Henry Edwards, from Northern California.

The species equals *Egleis* and *Eurynome* in size, and is distinguished readily by the ferruginous under surface.

ARGYNNIS CHITONE.

Male.—Expands 2.25 inches.

Upper side dull fulvous, much obscured by brown at bases of wings ; both wings edged by two fine parallel lines, between which are fulvous spaces ; the crescent sub-marginal spots and the extra discal rounded spots small ; the other markings rather slight.

Under side of primaries pale yellow-fulvous over basal area and posterior half of wing, the outer upper part of cell and the apical interspaces buff ; the nervules on apical area broadly edged with ferruginous ; the patch same color ; the sub-marginal spots buff, with no silver.

Secondaries light ferruginous, considerably mottled with buff ; the belt clear buff, broad ; hind margin dark brown ; all the spots small and but imperfectly silvered ; the outer row narrow crescents, with ferruginous edging to upper side ; the spots of second row mostly sub-ovate, the first three from costa nearly same size, the fifth a broader oval ; all edged slightly by black on upper side ; those of third row more heavily edged by black ; in cell a round spot in black ring, an oval in ring below ; shoulder and inner margin buff.

Female.—Expands 2.5 inches.

Nearly same shade as male ; the marginal lines more or less confluent on primaries. The spots of under side are sometimes well silvered, or the marginal only are silvered, the remainder buff, with a few silver scales ; in some examples the ground of secondaries is deep ferruginous, encroaching much on the belt, and with very little mottling of buff.

From several examples received from Mr. B. Neumoegen, and taken in Southern Utah and Arizona.

ARGYNNIS NITOCRIS, Edw., ♂ Trans. Am. Ent. Soc., v., p. 15, 1874.

In the male this species is bright red-fulvous, the basal area darkened by brown. In markings it closely follows *Nokomis* male, which it equals in expanse of wing, 3 inches. The under side of primaries is cinnamon red, at apex ochre-yellow ; of secondaries deep ferruginous, with a broad reddish-ochraceous belt ; the spots same size and shape as in *Nokomis*. For a long time the species was known to me by the single male

described, a very fresh and perfect one, taken by Mr. H. W. Henshaw, in Arizona. In 1878, I received from Mr. C. E. Aiken, of Colorado Springs, several lepidoptera taken by him in Arizona; and among them was a second male *Nitocris*, in bad condition, and a female nearly perfect in color. This differs from the male as widely as does the female of *Nokomis* from its male. I give description of it.

NITOCRIS, female. Expands 3 inches.

Upper side blackish brown. Darker than *Nokomis*, the black markings of disk lost in the dark ground; the extra discal spots as in female *Nokomis*, being in transverse rows, and of a pale yellow color, the small submarginal spots whitish; the spots of secondaries narrower than in most examples of *Nokomis*, owing to the broad edging of brown upon each nervule; they are also much dusted with brown, and only on the outer part of the spots opposite the cell is the clear buff ground or pale yellow ground to be seen. Under side of primaries fiery-red over all the wing except the apical area, which is yellow; the sub-apical patch brown, and the nervules on that area are much bordered with brown; on the patch two small silvered spots, and the five or six uppermost marginal spots are small and imperfectly silvered. Secondaries have the ground of an uniform blackish brown, a little dusted by ferruginous next base and along the nervures; the belt yellow, divided into spots by the dark nervules, and the margin of each spot is dusted, so that the clear yellow is seen only in the middle; hind margin nearly black with an indistinct yellow stripe, broken at the nervules; the marginal spots small, silvered, surrounded by a jet black border; the other spots shaped as in the male and silvered.

I have recently received a male *Argynnis* from Dr. Jas. Bailey, of Albany, N. Y., much worn and broken, one of three which were taken at Elko, Nevada, which seems to me to be no other than *Nitocris*. It expands only 2.75 inches, and the limb of each wing is faded out. But the disk retains much of the natural fiery hue, and the markings show that the insect belongs to this sub-group. So also with the markings of the under side. What became of the other two examples taken Dr. Bailey does not know. Apparently the species was much out of its range at Elko.

PAPILIO BAIRDII, Edw., ♂. Proc. Ent. Soc. Phil., vi., p. 200, 1866.

I found the example described in a bottle, with cotton, at the Smithsonian, sent I think by Dr. Palmer. It was badly abraded, and the tails

and antennæ wanting. But the yellow band was unusually well developed, and showed plainly that the species was not *Asterias*. Afterwards by some years both males and females were received among the collections made by the several Wheeler Expeditions, mostly in very bad condition. Recently Mr. Neumoegen sent me several examples of both sexes, some in fresh and beautiful state, and I shall find among them materials for a Plate in But. N. A., Part viii. The males differ much in the discal band, some showing this to be more than twice its breadth in others. In some the spots are close together, forming a continuous band, divided by the nervules only; in others there is a wide black space between the spots. All have these spots fading gradually out on the basal side, instead of being clear cut; and on the outer side, or towards hind margin, nearly all on primaries are concave, sometimes a few straight, and rarely any of them convex. On the under side there is an absence of the fulvous color which characterizes all examples of *Asterias*, there being at most a slight ochreous discoloration on the outer edges of the spots of the band on secondaries, and sometimes this is wholly wanting, or is restricted to the two or three spots against cell. In fresh examples there is a belt of yellow scales on the black area between the marginal and discal spots of primaries, such as is seen in *Machaon*. The female shows only traces of the discal band, sometimes limited to three or four obsolescent spots on the upper part of primaries, or perhaps entirely across primaries. In one example under view these traces continue across secondaries, but in others they are absent. In all, however, there is a large spot of yellow more or less dense on costal margin of secondaries. So the spots of the marginal row on secondaries seem never to be distinct in the female, and often represented by a few scales only. In both sexes there is much variation in the extent of the blue clusters on outer limb of secondaries. In the original example, male, there is no blue except in a crescent over the anal spot; in other males there are slight clusters on the posterior half of the wing, and in others they extend quite across, but gradually diminish in size towards costa. In the female these clusters are larger and more dense, and reach from margin to margin. On the under side the discal band is always distinct on secondaries, and considerably more so on primaries than appears on upper side. There is a little more of the ochreous also on secondaries.

Mr. Strecker, Cat. page 72, has entered this species as *ASTERIAS*, var. e. *UTAHENSIS*, NOB., and puts *Bairdii*, Edw. as a distinct species, but

with the remark that if his recollection is right, *Bairdii* is very near or perhaps same as var. *Asteroides* (his var. d. of *Asterias*.) *Bairdii* and *Asterias* are two distinct and well marked, though allied species, and my description of the former was explicit enough. So far as yet appears, it is restricted to So. Utah and Arizona, but probably will be found in Mexico. *Asterias* is found also in Arizona (as well as Mexico), and I received several examples ♂ ♀ from the Wheeler Expeditions. They do not differ more from the northern form than individuals of a single brood (from one laying of eggs) are found to differ in W. Va. Invariably they are characterized by deep fulvous spots of under side.

P. ASTEROIDES, Reakirt, Pr. Ac. N. Sci., Phil., 1866, p. 43; not Strecker plate vi. fig. 4, and description.

Reakirt described this species thus: "*Marked nearly as in Asterias; the inner yellow macular row (i. e. discal band) upon the fore wings is almost obsolete, except the spot upon the inner margin, which is prolonged into a dash. Hind wings as in Asterias female, but the blue clouds are reduced to small rounded patches; tail not so long as in Asterias. Below, a (discal) row of large fulvous sagittiform spots on fore wings. Secondaries as in Asterias.*" I indicate the important part of this description by italics. The female was not described, and apparently Mr. Reakirt knew only a single male, from Mexico.

Mr. Strecker figures a female but describes both sexes. The male is said to have an inner (discal) band of *eight triangular yellow spots*, and as the contrary is not stated, it is to be inferred that this band is conspicuous, and not obsolete; secondaries a *yellow mesial (discal) band divided into seven parts* (or spots); blue clusters, &c., (which are always found in *Asterias* ♂); beneath the spots of discal band on primaries fulvous; secondaries same; *tails like Asterias. Female has the discal band of primaries a little broader and of same width throughout.* His ♂ ♀ are from Costa Rica. He also says that Reakirt's type ♂ has the spots of discal row of primaries much suffused with black, the last few near costa obsolete or nearly so. Nothing said of the remarkable mention by Reakirt that secondaries are like female *Asterias*, excepting in the size of the blue patches; which means that the discal band and marginal spots are as in *Asterias* female.

Plainly here are two different insects described under one name, and Strecker's *Asteroides* is not at all that of Reakirt. The insect figured as a

female has the markings of a male, something never seen in *Asterias* unless in bi-formed examples, of which for aught I know this may be one. If it is not, a good species is wandering without name. The male is described as characterized by a single row of seven spots on secondaries, the usual (i. e. in *Asterias*) eighth spot at end of cell being absent. Now males of this type are common enough. I have repeatedly raised them at Coalburgh from eggs of the normal *Asterias*, and have them from many localities, even to Costa Rica. But I have never seen such wings attached to a female body.

I have lately received from Mr. F. H. Godman two males from Costa Rica, marked *Asteroides*, one of which answers Reakirt's description very closely. It has the discal band of primaries obsolete, represented only by little clusters of yellow scales, and extending across the wing. On secondaries this band is partly present, there being a small spot on costa, and spots in the four posterior interspaces; but of these last the one in upper median is almost gone. The clusters of blue are small and round, and the tails are shorter than *Asterias* perceptibly. On the under side the spots of discal row are distinct on both wings and as in *Asterias*; also they are fulvous. This is in agreement with Reakirt's type. In *Asterias* female there is often an imperfect row of yellow spots on secondaries, varying in fact from a complete row of distinct but small spots, to nil, except that the costal spot is always present. Therefore, when looking at the male I have described, Reakirt's general comparison to female *Asterias* seems natural. It is in respect of the discal band only, for he calls attention to the smallness of the blue clusters, which is a characteristic of *Asterias* ♂, while in ♀ they are always very large.

The other male from Costa Rica has the discal band on primaries absolutely wanting—not even a scale being there—on both surfaces; the marginal spots of both wings are very small. On secondaries the discal band is represented by a minute cluster of yellow scales on costa and in three posterior interspaces. On the under side this row is complete, but of smaller spots than I ever have seen in *Asterias*, and they are fulvous. The tails are not shorter than in *Asterias*. This absence of the discal band on both sides of primaries is so remarkable that this example may be of a distinct species, especially as there are other points of difference from *Asterias*. But the one I have first described is apparently Reakirt's *Asteroides*, and there is no evidence that it is a variety of *Asterias*. Till such evidence is produced it should be regarded as a good species.

ANTHOCHARIS THOOSA, Scudder, ♀, Hayden, Bull. iv., p. 257, 1878.

Male.—Expands from 1.25 to 1.4 inch.

Upper side white; primaries have a large orange apical patch, limited on basal side by a broad black bar, which extends from costa to inner margin; this is composed in part of the discal bar, which is broader than is usual, but there is no break in its course, and either no narrowing below the cell, or very little; and scarcely any difference in texture, the entire bar being coarse grained with rough edges; the margin from upper to lower end of the patch edged with brown narrowly, with a serration in each interspace. Secondaries have a few black scales on the edge of margin at each nervule; on the anterior half of the wing these become small clusters, but seem never very distinct.

Under side of primaries dusted over the apical area and down hind margin to median with brown scales, on a white ground at apex, but pinkish ground outside the patch; this is restricted, hardly half as large as on upper side, more yellowish; the discal spot confined to arc of cell, with an angular sinus on outer side. Secondaries white, much covered with gray-brown scales (like those of *A. Julia*) disposed in small clusters mostly, along the nervures and branches; these are connected by intermediate scales near the margin, making a sort of border to the wing.

Female.—Expands 1.4 inch.

Upper side white tinted with lemon yellow, deepest on disk of secondaries; the orange patch narrow; the apical and marginal area brown, enclosing a chain of yellow spots, which on lower part of margin cut through the brown border; the discal spot broad, blackish, arose on outer side, not extending below extremity of arc; on secondaries clusters of scales at ends of all the nervules. Under side scarcely different from male.

From 3 ♂ 1 ♀ sent me by Mr. Neumoegen and taken in Arizona, and 1 ♂ from same region by the Wheeler Expedition.

The single female described by Mr. Scudder was taken at Mokiak Pass, Arizona, "20 miles east of St. George; a pass in mountains between St. George and Juniper Mts., in a very broken and rough volcanic region." Scudder.

ANTHOCHARIS STELLA.

Male.—Expands 1.4 inch.

Upper side delicate lemon-yellow; primaries have a large bright

orange patch limited on inner side by the discal spot and a stripe in line with same, starting from hind margin and narrowing; sometimes this stripe is at first black and dense, but dissolves into separate scales as it nears the discal spot, or it is throughout but a long cluster of scales, becoming obsolete near the spot; this last is a narrow, straight and black bar, clear cut on inner side, but on outer side usually a little incised, widening somewhat on sub-costal and not quite reaching the edge of the margin; apex and hind margin to the stripe narrowly bordered with black, with inner edge serrated; sometimes on the margin this border is broken into spots. Secondaries have small clusters of black scales at the ends of the nervules, sometimes wanting; fringes of primaries yellow, very little orange tinted next the margin, a broad black space at end of each nervule; of secondaries yellow, slightly black at nervules.

Under side pale lemon-yellow; the apical area a little deeper tinted, and pinkish next the patch, all sprinkled with fine spots of grayish-green; the patch restricted, less bright; the discal spot bisected, the upper part being quadrangular, the lower triangular; secondaries have the nervures and branches yellow, just at base orange, or varying from yellow to orange; the surface much covered with little patches of grayish-green, disposed along the nervures, but extending well into the interspaces.

Female.—Expands 1.4 inch.

Deeper colored than the male; the orange patch not more than half the width in male, paler; the border brown, deeply serrated and having on inner side a series of connected yellow spots, serrated without, yellow; at the base of each of these, and partly lying on the orange ground a cluster of brown scales; discal spot as in male; the under side differing from the male only in the depth of yellow.

Mr. Morrison brought examples of this species from Nevada, 1878, and I have seen 12 or 14 of these. I have formerly received the same from Lake Tahoe, and other neighboring localities. Mr. Mead took about a score at Yo Semite, all which were examined by me. The size is that of *Reakirtii* and *Thoosa*. The color unlike either, being lemon-yellow in both sexes, whereas *Reakirtii* is sordid white in both and *Thoosa* white in male. The orange patch is brighter and the limiting band is not continuous nor of uniform density as in both these species. On the under side the color and shape and abundance of the spots on secondaries is nearest *Thoosa*. In *Fulia* these are larger, and cover considerably more

of the surface. *Fulia* is a smaller species than *Stella*, the male clear white. I have a variety of *Stella* taken by Mr. Morrison, in which all the dark markings are faded to the palest ashy-brown tint ; the orange is also pale ; on the under side the markings are almost obsolete.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KY.

LITHOCOLLETIS.

L. argentinotella Clem.

This species varies in color from very pale golden yellow to reddish saffron, and in size from about one-fourth of an inch to about one-third. Likewise as to the size and distinctness of the marginal streaks on the fore wings and as to the dark margins of these streaks. Sometimes only the second dorsal and costal will be dark margined, and these not very distinctly ; and sometimes all, including the basal streak, will be distinctly dark margined. I add to Dr. Clemens' description as follows :—The tuft on the vertex is white in the centre, saffron on the sides ; abdomen on the upper surface fuscous gray, anal tuft yellowish silvery ; under surface and legs silvery white, the anterior surface of the legs marked with brown.

L. triteniaella Cham.

I have a male* (bred) in which the second fascia does not reach the dorsal margin by more than one-fourth of the width of the wing. The *al. ex.* ranges from $\frac{1}{4}$ to $\frac{1}{3}$ inch.

L. Bethuneella Cham.

Sometimes the opposite costal and dorsal spots are confluent, forming fasciæ. At least such is the case with some captured specimens which are not otherwise distinguishable from this species, and so also is a single bred specimen received some years ago from Miss Murtfeldt.

L. Fitchella Clem.

This species makes a mine on the under side of leaves of various species of Oaks, which is scarcely, if at all, distinguishable from the mines of *L. basistrigella* Clem. It is roomy, tentiform, elliptical or nearly circular, and pale ochreous yellow.

Formerly, before I had seen *L. quercitorum* Frey & Ball, and trusting to the published description of that species, I suggested that it was probably identical with *Fitchella*. I have since then bred it, and though they are more closely related than either is to any other known American species, yet they are quite distinct. *Fitchella* connects *argentinotella* Clem. with *quercitorum*, though the resemblance of the species is by no means close, and it is nearer *quercitorum*. It is less golden than *argentinotella*, less brownish golden than *quercitorum*; *argentinotella* has four, *quercitorum* three, and *Fitchella* two silvery white dorsal streaks; in all three the first dorsal is the largest, but it is much larger in *Fitchella* than in *argentinotella* and still larger in *quercitorum*; in *argentinotella* this first dorsal is nearly triangular, in the other two species its upper or anterior edge is rounded and the apex produced backwards so that the posterior edge is concave. The mine of *quercitorum* is larger and of more irregular shape than that of *Fitchella*, which resembles that of *argentinotella*, but is larger. *Fitchella* and *argentinotella* are of about the same size and smaller than *quercitorum*. There are other differences, and I have only alluded to the most striking. In each there are five silvery white costal streaks similarly placed and of nearly the same size. Dr. Clemens bred it in Pennsylvania, and I have bred it in Kentucky, and have also received it from Texas. *Argentinotella* is very abundant in Kentucky, but *quercitorum* I have met with only in Colorado.

L. coryliella Cham.

Either by a slip of the pen or by a typographical error, the name of this species is sometimes mis-printed—sometimes *coryliella*, sometimes *corylisella*. *Coryliella* is the name intended, though perhaps it is too near *corylella* H. Sc., *coryli* Nic., and *coryifoliella* Haw. The statement in the original account, Vol. 3, that it *only* differs from *guttifinitella* Clem. by having one more dorsal streak near the base is too broad. That is the most striking difference, but there are others more minute. This dorsal streak is there said to be dark margined *internally*; it should read *externally*. The species mentioned v. 3, p. 166, as mining leaves of Water

Beech (*Carpinus Americana*), is this species. In all the specimens, whether bred from Hazel, Iron-wood or Water Beech, the fasciæ are scarcely or not at all curved, but are placed obliquely across the wing and are nearest to the base of the wing on the dorsal margin. I have found it more abundant on the Water Beech than on either of the other food plants. It, and indeed all the species feeding on these plants, are very different from the European species feeding on allied plants and mentioned above, and from *Carpinicolella*.

L. Clemensella Cham.

The suggestion elsewhere made that the mine and larva of this species in Maple leaves might perhaps be distinguished from those of *L. lucidicostella* Clem., by finding that this species pupates in a cocoon of frass, is not supported by the facts. I know of no way in which the species can be distinguished in their early stages.

L. ostryæfoliella Clem.

Dr. Clemens' description of this species is exceedingly inaccurate, so much so that captured specimens would scarcely be recognised in it. The same is true, likewise, of his description of *L. obscuricostella*. Both of these species make small tentiform mines on the under side of *Ostrya* leaves. No other species is known to make similar ones in these leaves. Bred specimens may therefore be recognised in the descriptions.

L. juglandiella.

Dr. Clemens bestowed this name upon a species known to him only by the larva and mine, suggesting that it might not be different from *L. caryæfoliella* Clem.; and in a former volume I stated that it was *caryæfoliella* in my opinion. Since then I have succeeded in rearing the imago, and find that we were not in error in this respect. It is *caryæfoliella*. *Caryæfoliella* is a very variable species, as I have stated in Vol. 4, and is very difficult to rear, especially from the Walnut-feeding larva.

L. qornatella Cham.

I have bred great numbers of this species and find no variation in the fasciæ and marginal streaks, though the ground color of the wings varies from those in which the basal portion is maroon brown, as stated in the description, to those in which the entire wing (except the dark margins of the streaks and fasciæ) is bright golden.

L. trifasciella Haw.*L. Mariæella* Cham., *Cin. Quar. Four. Sci.*, v. 2.

I am convinced that *Mariæella* is *trifasciella*, though there appear to be some minute differences between them. The latter was not known to me when I described the former, and strangely enough, the relationship of *Symphoricarpus* to *Lonicera* did not suggest to me that the species might be the same. I have never yet met with a *Lithocolletis* mining leaves of Honeysuckles, and have not bred this species from *Symphoricarpus*. It was described from specimens bred from *Symphoricarpus* in Missouri by Miss Murtfeldt. *L. symphoricarpaceella* Cham. is the only species that I have bred from that food plant in Kentucky. It is very distinct. As stated above, I have never met with any Honeysuckle species in the U. S. Prof. Riley, however, informs me that he bred a species, most probably *trifasciella* Haw., from that plant in Illinois, and Frey & Ball doubtfully refer an American Honeysuckle species to *trifasciella*.

L. obscuricostella Clem.*L. virginiella* Cham.

In a former Vol. of the CAN. ENT. I have mentioned that there is no such species as *L. virginiella*. It was described from a few specimens bred from *Ostrya* leaves. The specimens were a little worn, and owing to this, and to the very defective character of Dr. Clemens' description of *obscuricostella*, which I had not then seen, they were supposed to belong to a new species, to which I gave the name of *virginiella*. Since then I have seen and have bred numerous specimens of *obscuricostella*, and recognise *virginiella* as the same species, which probably I should never have done by Dr. Clemens' description. I was also in part led into the error by the mines from which *virginiella* was supposed to come. No mines of *obscuricostella* were observed in the leaves, but there must have been a few which escaped notice, and which produced the species. The mines which were observed in the leaves, and which were supposed to be those from which *virginiella* came (no others having been observed in the leaves) prove by subsequent experience often repeated to be the mines of *L. tri-tæniæella* Cham. A large gathering of these mines produced on that occasion nothing, while a few mines of *obscuricostella* in the collection which escaped observation produced *obscuricostella*, which not being recognised in Dr. Clemens' description, and coming apparently from new mines,

was described as "*L. virginella*, n. sp." The mine is described correctly in Vol. 4.

LEUCANTHIZA.

L. amphicarpeæfoliella Clem.

L. Saundersella Cham. is the same species. There is probably sufficient reason for separating it from *Lithocolletis*, though the propriety of so doing is not altogether unquestionable.

BUCCULATRIX.

B. luteella Cham.

I have received from Texas (Belfrage) specimens which I refer to this species, but as they are all slightly worn, and yet appear rather more deeply colored—that is, more of an ochreous yellow—it is barely possible that they may belong to another species.

NEPTICULA.

N. serotinælla? Cham.

A single captured specimen received from Mr. Belfrage, in Texas, seems on comparison indistinguishable from this species. Yellowish silvery would perhaps characterize the eye-caps and occiput better than golden, as I have described them. In a series of specimens no material difference is found in the width of the fasciæ; the antennæ are black and the under surface of the body and the legs are dark plumbeous.

N. quercicastanella Cham.

The palpi, eye-caps and occiput are perhaps better described as pale ochreous than white. The abdomen and under surface of the thorax have a decidedly greenish tinge.

ON A MITE PREYING ON THE ORANGE SCALE INSECT.

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

About the last of March my friend, Mr. Allen Curtiss, a botanist, brought me some Orange twigs infested with the Orange Scale Insect (*Aspidiotus Gloverii*). On examining them with my pocket lens, I was

surprised to see numerous small black mites running in and out of the scales, and which no doubt prey upon the eggs of the Scale Insect, and probably prevents their increase. Since then I have been enabled to examine them with a more powerful microscope, and I think they are entirely new to science. As far as I can find out, they belong to the family Oribatidæ Nicolet, and resemble very much Packard's *Nothrus ovivonis*. I submit the following brief description:

Oribates ! aspidioti, n. sp.

Elongated, flattened, narrowing towards head, dark reddish-brown color; abdomen pubescent, with two oval capitate processes, the first in centre just back of thorax, the second just below middle of abdomen, and both striate; outer edge slightly serrate; four legs, stout, and with but one claw curved inwards, with three or four basal hairs. Length about .02 inch.

It is easily distinguished by the two oval processes.

ON A NEW SPECIES OF POLIA.

BY A. R. GROTE, A. M.,

Director of the Museum, Buffalo Society Natural Sciences.

In the collection before me are the following species referred to *Polia*, but in the absence of a series of the European forms I am not clear that they are finally to be left in this genus. I have separated under the name of *Pachypolia atricornis* a stout and shaggy species, taken by my friend, Mr. Westcott, which has strongly pectinated antennæ, a character not accorded by Lederer to the European species, but one which is only doubtfully of generic value. To distinguish these species from *Hadena* is certainly difficult. They have less prominent, almost obsolete, tuftings, and are usually gray in color with admixture of yellowish (*pallifera*) or blackish (*perquiritata*?, *acutissima*), or even brown (*medialis*), and again one (*diffusilis*) is bluish gray, darker than *Apatela americana* and approaching in tint to *Lithophane capax*.

The new Western species here described agrees with *Pachypolia* in the pectinate antennæ of the male, but is much less shaggy and more slender.

In *diffusilis* the male antennæ are brush-like, perhaps sufficiently serrate to be called pyramidal-toothed (*pyramidalzæhnig*). Of *pallifera* I have only the female type; the abdomen is more noticeably tufted than in the other species. I am doubtful about my determination of *perquiritata*, and it is probable that I do not know any of Mr. Morrison's species of *Polia*. In *medialis* the male antennæ are bi-pectinate, but the pectinations are very short. In *acutissima* the male antennæ are also shortly bi-pectinate. In *Pachypolia atricornis* the head is more sunken and the male antennæ are lengthily bi-pectinate. I do not know at this writing either Mr. Morrison's *confragosa* or his *speciosa*, and from his descriptions do not think that I have seen them.

I am not certain that the eyes are unlashed in our species, but I can not make the lashes out with certainty. Lederer calls the eyes unlashed in *Hadena*, and lashed in *Polia*. So long as the corporal tuftings are used as generic characters we shall have some uncertainty as to the best position of many species belonging to the Hadenoid group, until we have series of bred specimens of our species.

Polia illepada, n. s.

♂ ♀. The male antennæ are bi-pectinate, ciliate. Thorax with inconspicuous tuft in front and behind. Abdomen apparently without tufts. Eyes naked, unlashed (?); tibiæ unarmed. Size rather large; wings elongate. Hind wings of the male white or whitish; of the female gray or smoky; an even mesial shade band more or less apparent; veins a little darker; a terminal line. Beneath whitish or gray with obsolete marks. Fore wings dark gray. Reniform rather large, curved, sometimes a little brighter tinged, pale gray, with an interior darker shading, ringed with dark; orbicular pale gray, spherical, rather small, not constant in size, blackish ringed. Lines even or very little denticulate, single, more or less indistinct and obliterate, except the subterminal, which is blackish, jagged, running obliquely inwardly from below apex to between veins 4 and 5, thence outwardly, and from vein 3 again inwardly to within internal angle. T. p. line followed by a pale gray shade. Fringes of primaries gray, paler at base; a fine dark terminal line and small blackish points.

Thorax gray, without marks; abdomen paler, in the female terminating somewhat squarely.

Expanse 40 to 42 mil. *Habitat* Nevada, Colorado (Dr. Bailey and Mr. Graef.)

Except in the antennæ, and possibly the unlashd eyes, this species seems to agree with Lederer's definition of *Polia*. It is to be recognized by the even median lines, the jagged angulated subterminal line, the difference in the tint of the hind wings in the sexes, and its effaced and inconspicuous ornamentation.

ON THE LARVAL CHARACTERISTICS OF CORYDALUS AND CHAULIODES AND ON THE DEVELOPMENT OF CORYDALUS CORNUTUS.

BY PROF. CHAS. V. RILEY.

(Abstract.)

The paper relates to the development of one of the most singular and interesting of North American insects—the largest of the Order Neuroptera. In its perfect state this insect is a great, clumsy, nocturnal fly, popularly called Hellgrammite, and characterized by the jaws of the male being converted into a pair of long, curved, cylindrical and tapering prehensile organs, like the finger of a grain-cradle. In the larva state it is aquatic and much esteemed as fish-bait by fishermen, who call it a "crawler," "dobson," etc. Indeed, one of the most popular artificial fish-baits is a patent india-rubber imitation of it. This larva is very peculiar in having in its latter stages three distinct sets of breathing organs, viz.: the ordinary spiracles, a lateral series of long, single bronchial filaments, and a ventral series of spongy branchiæ, composed of numerous branching and tractile filaments. The eggs of this insect are laid, to the number of about three thousand, in curious masses on the leaves and branches of trees, or upon any other object overhanging water, and were first described by Mr. Riley at the Buffalo (1876) meeting of the Association. After comparing the eggs with those in the female abdomen, and the newly hatched with the mature larva, he felt quite

certain as to the parentage of the curious eggs. Yet the newly hatched larva which he described differed from the mature larva in lacking the ventral branchiæ, resembling in this respect the mature form of another aquatic larva of an allied genus (*Chauliodes*), and as some leading entomologists believed that the eggs described by Mr. Riley might belong to this last genus, further evidence as to the real nature of said eggs was desirable. The paper presents this evidence and confirms the previous determination. The *Corydalus* larva is traced through its stages of growth and then compared with that of *Chauliodes*. Several interesting scientific facts are brought out. The larva undergoes about six moults. The double nature of the thoracic tracheæ in *Corydalus* appears in the first larval stage, and the branchial nature of the lateral filaments is proved by the tracheæ leading to their tips. The ventral branchiæ first appear in the second stage (after first moult) and from three main stems each with bifurcate or trifurcate filaments. The branching filaments become more and more numerous and complex with each moult. The tracheæ also lead more and more strongly to these ventral branchiæ and less strongly to the lateral ones, with age. The stigmata are obsolete in the first three stages and in the fourth are only clearly distinguishable on the four or five larger abdominal joints, being still obsolete on the terminal ones.

The motion of the larva is invariably backwards. When newly hatched it moves actively about in the water by sudden sweeps of the abdomen beneath, very much as a lobster is known to do; and even when full grown a somewhat similar motion is employed in swimming. In the water a constant motion of the ventral branchial tufts is kept up, the main stem being first moved quickly backward and upward so as to bring the whole tuft close to the body, the filaments of which it is composed being then closely appressed to each other. The main stem is then brought more slowly down in the opposite direction, when the filaments spread and enlarge the whole to its utmost. In pure water the motion occurs about once a second; as the water becomes impure the motion becomes more rapid, and the larva issues from the water as soon as possible, being able to live out of water for several days even when only a few months old. Well developed ova are found even in the larva when only two-thirds grown.

The paper gives detailed comparative descriptions of the *Corydalus* and the *Chauliodes* larvæ. This last may always be distinguished from the former by having a smooth and unarmed skin; that of *Corydalus* has

a skin roughened with granulations and capitate or clavate projections (overlooked by previous describers), the little projections being visible even in the first stage, at which time they are less capitate. The *Chauliodes* larva has the last pair of spiracles on the tips of a pair of contractile filaments described as setæ by Walsh, who failed to apprehend their real nature and wrongly described the *Chauliodes* larva as having one pair of spiracles less and one abdominal joint less than that of *Corydalus*, whereas both larvæ have the same number of joints and spiracles, and both possess the rudimentary mesothoracic spiracle, which Mr. Riley finds more common in insects than is generally supposed. In other structural respects, as well as in habits and transformations, the two larvæ greatly resemble each other. The eggs of *Chauliodes* have a longer tubercle or stem on the top, and are not covered with white albuminous material as are those of *Corydalus*. Mr. Riley has obtained large additional numbers of the egg masses of the latter during the past summer, finding them not only on the leaves as described in his former paper, but on the stems of different trees, as well as on rocks overhanging water. He has had as many as twenty egg masses on a single maple leaf, both sides of the leaf being completely plastered up by them; and as a large number of these masses will generally be found in some one particular locality, or on a few branches of the same tree, the assumption is that the females congregate for purposes of oviposition. The white, albuminous substance covering these eggs shows by analysis that it has all the physical properties of wax.

HOW DO CRICKETS PRODUCE THEIR SOUND?—I have frequently tried to find out how crickets produce their well-known chirrup; but only on one occasion did I succeed in inducing a cricket to exercise itself in that direction, they having apparently a great objection to “sing” in captivity. On the occasion I refer to, I put two crickets—a pair—under a tumbler, whereupon the male immediately raised its elytra and shuffled them together, producing a noise which would be best represented by the word “shilly.” It repeated this several times with its head towards the female, who probably considered herself insulted, for she literally clawed his face with one of her hind feet, supplementing this action with a sudden and violent kick, and from that time the male took no more notice of her.—*J. P. B., in Science Gossip.*

OTTAWA FIELD-NATURALISTS' CLUB.

We are glad to learn that the Naturalists resident in Ottawa have organized under the above heading, with the avowed object of paying special attention to the Natural History of the Ottawa District. The Club is under the patronage of His Excellency the Governor-General, and has an efficient staff of officers; among them we observe the names of two of our esteemed contributors, J. Fletcher and W. H. Harrington, both enthusiastic Entomologists, and we are pleased to see Entomology so well represented in this connection. It is intended to have occasional excursions during the summer, and evening meetings during the winter for the pursuit and discussion of Natural History subjects. Already the Club has had one very successful excursion, the party numbering in all, ladies and gentlemen, about forty. We should like to see such clubs organized in every city in our Dominion. There is a growing fondness for this interesting study, especially among our young people, and a little stimulus of this sort would materially aid in developing it.

PERSONAL.

A WELL-MERITED HONOR.—We learn with much pleasure that our eminent American Coleopterist, Dr. John L. LeConte, of Philadelphia, has been elected an honorary member of the Société Entomologique de France. The honorary membership in this Society being limited to twelve, and the only other representatives of the English speaking races being Darwin and Westwood, we feel that a high compliment has been paid to American Entomologists by this selection, and a deserved appreciation shown of the unceasing efforts of this distinguished author in his endeavors to promote the interests of Entomological Science.

Mr. B. Neumoegen, of New York, an enthusiastic Lepidopterist, is anxious to obtain as large an amount of material as possible in his department from the northern portions of America, and will be glad to hear from any one who will collect for him in any part of British North America, especially in the north-west, and in the Island of Anticosti. Mr. Neumoegen's address is P. O. Box 2,581, New York.

Dr. Henri de Saussure, of Geneva, Switzerland, wishes to procure specimens of a small parasite found on the Beaver, and which, he says, is only to be obtained in Canada. It is the *Platypsyllus castori*. We trust that some of our readers may have an opportunity of procuring specimens of this insect, either from hunters or from the dry skins in commerce, in which dead specimens may occasionally be found. They may be preserved in a small bottle with a little brandy.

CORRESPONDENCE.

DEAR SIR,—

Dr. Sharp writes me that he finds among our American *Graphoderes fascicollis* Harris, considered by Crotch as the European *cinereus*, several distinct species. Now this form is not uncommon at the North, though both Dr. Horn and myself have very insufficient sets. Could you ask some of our Canadian friends to send me all their specimens for examination? I will return named sets, *all*, if desired, but would like to keep two or three specimens for Dr. Horn and myself. This form has a very wide distribution through Canada to Hudson Bay Territory and California, and I would like to see as many as can be brought together.

JOHN L. LECONTE, M. D., Philadelphia.

DEAR SIR,—

I enclose the wing of a moth which I left with some other choice specimens on my setting-boards while I was absent in Nova Scotia last summer. I thought they were safe enough for three weeks, but you may imagine my dismay when I found on my return a number of *Dermestes* larvæ rioting on my insects. Some were quite destroyed. I at once cleared them off, smeared the boards with tallow and replaced the insects which remained. The larvæ I placed in paste-board boxes. In one I put a bit of tallow, and in the other some worthless specimens. Before twenty-four hours the former had eaten a hole through the box and escaped, and the others matured, passed through the pupa state and in due time became beetles. By this experiment I have made "assurance doubly sure."

Respectfully yours,

CAROLINE E. HEUSTIS, St. John, N. B.

[The wing enclosed is that of *Pheosia rimosa* Packard.—ED. C. E.]

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I also desire to correspond with any who are intending to collect LEPIDOPTERA in parts of North America where but little collecting has hitherto been done.

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No. 6

DESCRIPTION OF PREPARATORY STAGES OF PHYCIODES NYCTEIS.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG—Ovoidal, narrowing above, the base rounded, summit depressed ; the lower third smooth ; nearly a second third marked by irregularly hexagonal, very shallow cells ; and the remainder by vertical ribs, slightly raised, terminating at the rim of summit ; color whitish-green. Duration of this stage 9 to 13 days.

YOUNG LARVA—Length .06 inch ; cylindrical, each segment well rounded ; color green, translucent ; over the surface many hairs ; head ob-ovoid, bilobed, the vertices rounded ; color dark brown. Duration of this stage in June 10 days, in July 8.

AFTER FIRST MOULT—Length .18 to .20 inch ; color smoky-brown, semi-translucent, the under side greenish ; armed with seven rows, one dorsal and three lateral on either side, of stout, fleshy, tapering black spines, each surrounded by many short black bristling hairs ; over feet a row of minute similar spines, and on segment 2 a dorsal collar of small spines ; head black, ob-ovoid, high, the vertices rounded, covered more or less with black hairs. To next moult, in June 3 days, in case of the larvæ which proceeded to maturity ; in July, 3 to 4 days.

AFTER SECOND MOULT—Length .24 inch ; color black-brown, the spines longer in proportion, with broad bases, all shining black ; under side greenish-brown ; head as at last stage. To next moult, in June 4 to 5 days ; in July 4.

AFTER THIRD MOULT—Length .34 inch ; color black-brown ; under side smoky-brown ; at base there sometimes appears a broken yellow stripe or narrow band, dotted with whitish, but most often the yellow is wanting and the color of the ground is dull green ; behind the dorsal row of spines are a few blue dots, arranged in two cross lines ; spines long,

stout at base, their tubercles shining black and meeting ; head rather cordate, flattened in front, the vertices rounded ; black, shining ; the surface much covered with black hairs. To next and last moult, in June and July, 3 days.

AFTER FOURTH MOULT—Length .50 inch, color and spines as before, but the band more definite. The larva grows rapidly and in three days reaches maturity.

MATURE LARVA—Length 1 inch ; cylindrical, slender ; color black-brown, the under side greenish-brown ; along the base a broad band, usually of dull green, with a yellow stripe in the line of lower lateral spines, and a macular yellow line running with the spiracles ; in some cases this band is wholly of ochre-yellow, or reddish-yellow ; the dorsum and sides much dotted with white, coarsely and irregularly on the side, but finely and mostly in regular transverse lines on dorsum ; the basal band much dotted and spotted with yellowish, and these marks are found also upon the under side ; spiracles black, round, in yellow rings, around each a circle of yellow dots, and between each pair irregular clusters of yellow dots and small spots ; body furnished with seven rows of long, tapering black spines, one dorsal, three lateral on each side, each arising from shining black tubercles, except those of the lower lateral row, which have greenish or yellow tubercles, and each bristling with short, black hairs ; those of third segment somewhat porrected ; on second a dorsal collar of similar but smaller, bristling spines ; legs black, pro-legs yellow-brown ; head cordate, vertices high and rounded, the front flattened, color shining black ; much covered with black papillæ, from which spring black hairs. Duration of this stage 3 to 5 days.

This is the history of such of the larvæ as proceed to chrysalis and imago the same season in which the eggs are laid, whatever may be the brood of the year. But a portion of every brood, and of the larvæ from every laying of eggs, so far as experiment shows, behave quite differently, and become lethargic and so pass the winter. The proportion of hibernators in the June brood in this district (i. e., the first brood of the year from egg) is about as 1 to 2, those which do not hibernate passing four moults and reaching the imago in July. But after the first moult of the brood is passed, a change takes place in the hibernators, and their development and growth is retarded, so that when the regulars are passing their third moult, these have but reached their second. And instead of being .24

inch long, black and with black spines and bristles, as the regulars were at their second moult, these are smaller, .22 inch in length, and russet in color, body, spines and bristles. After the moult, either not having fed at all, or but little, they gather in a cluster on a leaf or on the cover of the glass in which they are kept, and within twenty-four hours shrink to the length of .16 inch, and are broader in proportion than at first after the moult. This shrinking brings the bristles together so that the appearance is that of a brush, none of the skin being visible except under a magnifyer. In the second brood of the season from egg, the hybernators are about as 2 to 1, and in the last brood of the year all hibernate.

Immediately after arousing from lethargy in the spring the larvæ prepare for a moult, and this takes place either before any food has been eaten, or very little. On moving, the larva resumes its normal shape, becoming narrower and longer than when asleep, but still only .20 inch long. After the moult it is .22 inch, very nearly or quite what it was when the second moult took place in the fall. Color now black-brown, and the resemblance is close to the summer larvæ at second moult. Following a single larva in its changes, the second moult after hibernation took place 14 days after the first; length now .40 inch, and color and markings as in third summer moult. The next and last moult, or third after hibernation, took place four days after the preceding one, the weather having suddenly turned warm; length .60 inch. Eight days after the larva was in chrysalis. The mature larva measured one inch and resembled in all respects the summer larva at same stage. Other larvæ varied much in all their stages, as I shall presently show.

CHRYSALIS—Length .6, greatest breadth .18 inch. Similar in shape to *Phaeton*; cylindrical; abdomen stout, mesonotum rounded, moderately prominent, the intervening depression slight; head-case short, narrow, nearly square at top; on abdomen five rows of conical tubercles, two of them extending to mesonotum; the coloration varies extremely; some examples are wholly greenish-yellow, others pink-brown, others gray-brown; and usually in these there are but few dark markings, some patches of brown about head-case and mesonotum, and on wing-cases; the latter showing two parallel rows of brown dots along hind margins; the tubercles orange, each having a brown spot on its anterior side; others are brown streaked and spotted with black, and perhaps with more or less sordid white; and many, especially of the summer broods, are very

melanic, black over dorsal area and wing-cases, and black varied with brown on ventral side. Duration of this stage 7 to 10 days.

I have raised many broods of *Nycteis* the past five years, but only this season (1878) have I been able to assure myself fully of its peculiarities. Upwards of 50 larvæ were carried through last winter, and by separating them into small lots and regularly noting the changes in each, it was made certain that three moults occur after hibernation, instead of two as in *Tharos*. And treating the larvæ of the June brood with the same care, the complete winter and summer history is manifest. Of 92 larvæ from one lot of eggs laid 28th May, and all which passed their first moult about 18th June, 56 proceeded to second moult about 21st June, and third moult about 26th, and so on to chrysalis. But 36 lingered after the first moult, and 32 of them assumed the russet hibernating coat, before described, at second moult, while the remaining 4 came up then in black coats like the larger part of the brood, and slowly proceeded to chrysalis, which they reached many days after the others. These 4 seemed to have had a tendency to join the hibernators which was somehow counteracted, but they proceeded with a hesitancy at every stage till they reached chrysalis. The shrinking of the hibernators I have spoken of. These are now resting, some of them in the folds of a dried leaf, others on the tin cover of the glass they fed in, gathered in a close cluster, and if kept through the summer in a moderately cool place, and in the winter in a cool and dry one, will be apt to survive till next spring.*

Of the larvæ which I had alive last winter, most awoke 15th and 16th February, on being brought into a warm room, and moved about. Some fed a little and then rested for their first spring moult, which took place shortly after. Others passed this moult without feeding, for no food was given them. Others remained motionless, or if aroused, went to sleep again, and though subject to the same temperature and treatment as the active ones, did not pass their first moult till early in April, that is, fully six weeks after some of the others. Four larvæ of this drowsy lot passed their first moult 7th April, fed for a day or two very sparingly and dropped to sleep again. On 8th of May one of these began to feed once

* As the printing of this paper has been delayed nearly a year, I am able to add (June 1, 1879) that such of these larvæ as rested on the tin survived the winter with no loss, but those in the leaves all died. I have several times noticed that a cool metal surface protects the larvæ better than leaves, which are apt to become damp with changes in the weather, and mould.

more, and passed its second spring moult 10th May. On 16th inst. two more waked up and passed their second moult 22nd inst., and then went on through the remaining stages without farther delay and reached chrysalis 1st and 3rd June, and butterfly 13th and 14th, or two months after the first chrysalids of the brood had given butterflies. The first examples of *Nycteis* seen in the fields this year were on 20th May.

Several of this lot of chrysalids I put in the ice box, temp. 33° Far., time of exposure 12 to 18 days. Most were killed by the process, but three gave butterflies. They were not altered in color, and I had no especial reason for supposing they would be, as the species is not seasonally dimorphic, but I thought it probable the colors might be made to run, as in case of *Tharos* chrysalids exposed to similar degree of cold, in 1877.

Nycteis here feeds on *Actinomeris squarrosa*, but will eat *Aster*, though it prefers the other plant decidedly. I tied 4 ♀ in a bag upon *Actinomeris*, and as many on *Aster* the same day. The former gave at once three batches of eggs, but the others had laid none in 24 hours. I then transferred these to *Actinomeris*, and before night two of them laid. But I have nevertheless obtained eggs on *Aster* and raised the larvæ exclusively on this plant. The change in the food produced no difference on the larval coloring. In New York this species feeds on wild sunflower. There are three annual broods in this district—the first being in May and June, of which about one-third the larvæ hibernated; the second in mid-summer, of which about two-thirds the larvæ hibernated, and the third in autumn, all the larvæ hibernating.

August 1, 1878.

CAPTURES OF NOCTUIDÆ AT CLYDE, WAYNE CO., N. Y.

BY W. L. DEVEREAUX, RESIDENT.

It is hoped the following list of Noctuæ, taken principally at bait, will prove of some interest to readers of the CAN. ENT., although it is not a complete *exposé* of the fauna of this locality, having been compiled from but two years' catches—'75 and '76. During the season of '75 the weather was very favorable for sugaring, as there were always two or three

nights out of a week in which the baits were swarming with moths, from May to October, but baiting was not followed very steadily or thoroughly. Collecting was pursued steadily during '77 from May to August; five or six nights out of each week the baits were regularly attended, but after August 20th sugaring was nearly discontinued. Not a single night happened after this when moths were on the wing or found at bait, caused by the cold and dry weather. Thus the richest part of the season produced but very little during '77. Many species that were quite common in '75 were not seen at all in '76. The average number of baits each night was twenty-five, on trees in an apple orchard and vineyard.

Only the date of the first or earliest observation of each moth's appearance is affixed to each species, as most remain about a month; where they are known to occur longer the length of time is stated.

Lacinia cymatophoroides. June 20; not plenty at sugar.

" *expultrix*. June 14; unfrequent at sugar.

Acronycta acericola. June 14; common at sugar.

" *superans*. June 8; not uncommon at sugar.

" *noctivaga*. June 10; not plenty at sugar.

" *brumosa*. June 6; common at sugar.

" *occidentalis*. June 6; common at sugar.

" *lobeliae*. June 11; common at sugar.

" *connecta*. July 15; one taken at sugar.

" *hamamelis*. June 13; rare at sugar.

" *vinivula*. June 20; not common at sugar.

Bryophila corticosa. June 16; scarce at sugar.

Microcoelia diphteroides. June 15; common at light and sugar.

" *fragilis*. July 29; one taken at sugar.

Moma fallax. June 8; rare at sugar.

Agrotis clandestina. June 15; very plenty at light and sugar.

" *amputator*. July 17; common at sugar.

" *augur*. June 26; common at sugar.

" *alternata*. August 20; not common at sugar.

" *subgothica*. July 21; common at sugar.

" *c-nigrum*. June 16 to September; common at sugar.

" *bicarnea*. September 1; one taken at sugar.

" *suffusa*. June 16 to October; common at sugar.

" *sigmoides*. June 20; common at sugar.

- Agrotis plecta*. July 29; rare at sugar.
 " *baja*. July 25; rare at sugar.
 " *herbida*. June 24; scarce at sugar.
Mamestra subjuncta. June 17; not uncommon at sugar.
 " *legitima*. July 22; rare at sugar.
 " *herbimaculata*. July 28; rare at sugar.
 " *atlantica*. July; not uncommon at sugar.
Hadena rurea. June 14; common at sugar.
 " *vulgaris*. June 10; common at sugar.
 " *finitima*. June 7; common at sugar.
 " *lignicolora*. June 17; common at sugar.
 " *devastator*. June 20; very plenty at sugar.
 " *arctica*. June 15 to October; common at light and sugar.
 " *sputator*. June 19; common at sugar.
 " *lateritea*. July 21; rare at sugar.
 " *impulsa*. June 15; rare at sugar.
 " *delicata*. June 17; rare at sugar.
 " *verbascoides*. June 12; not common at sugar.
 " *modica*. July 13; rare at sugar.
 " *xylinoides*. June 12; common; second brood in August.
Dipterygia pinastri. June 17; not common at sugar.
Perigea luxa. July 22; scarce at sugar.
Callopietria mollissima. June 10; scarce at sugar.
Euplexia lucipara. June 7; frequent at sugar and at blooms of *Petunias*.
Brotolomia iris. June 21; scarce at rest and sugar.
Nephelodes minians. September 1; scarce at sugar.
Helotropha reniformis. July 24; scarce at sugar.
Hydroecia nictitans (with white spot). July 23; at sugar.
 " *var. lucens* (without white spot). July 17; common at sugar
 and in daytime on blooms of Milkweed (*Asclepias cornuti*).
 " *lorea*. June 12; common at sugar.
 " *sera*. June 18; plenty at sugar.
Leucania pallens. June 14; not plenty at sugar.
 " *phragmitidicola*. June 17; not common at sugar.
 " *pseudargyria*. June 9; uncommon at sugar.
 " *commoides*. June 28; one taken in grass.
 " *adonea*. June 30; one specimen at sugar.
 " *unipuncta*. June 28; plenty at sugar.

- Amphipyra pyramidoides*. July 21; common at light and sugar.
" *tragopoginis*. July 18; scarce at sugar.
Ceramica picta. Bred from larvæ found on Spearmint in autumn.
Tæniocampa incerta. June 10; scarce at sugar.
Orthodes infirma. June 24; uncommon at sugar.
Orthosia helva. July 31; scarce at sugar.
" *ferruginoides*. August 20; scarce at sugar.
Cirrhoedia pampina. August 26; one specimen at sugar.
Scoliopteryx libatrix. June 28; scarce at sugar.
Lithophane cinerea. September 10 and in warm spells in winter up to
April 15, at sugar, plenty.
" *pexata*. September 20; rare at sugar.
" *Bethunei*. October 6; rare at sugar.
" *signosa*. September 24; not common at sugar.
" *disposita*. September 21; rare at sugar.
Calocampa curvimaculata. April 30; at rest; hibernated.
Cucullia asteroides. May 20; at rest, and in August and September at
Petunias.
" *convexipennis*. Same.
" *Speyeri*. May 28; at rest.
Telesilla cinereola. July 20.
Plusia simplex. June 1; at Lilac blooms in day time, and in Sep. at rest.
" *precatiosis*. Same.
" *contexta*. September 1; one specimen at rest.
" *balluca*. August 9; one taken at Petunias.
Brachytaenia metana. June 30; uncommon at sugar.
Erastria carneola. June 1 to November; very plenty at sugar.
" *muscosa*. June 8; very plenty at sugar.
" *nigritula*. July 12; scarce at sugar.
Drasteria erichtea. May 15 to October; very plenty at rest and sugar.
" *erichto*. June 4 to August; common at sugar.
Ophiusa bistriaria. June 13; plenty at sugar.
Ingura oculatrix. June 28; one specimen at sugar.
Parthenos nubilis. June 14 to August; plenty at sugar.
Catocala parta. August 6 to October; common at sugar.
" *unijuga*. July 16; one at sugar.
" *Briseis*. July 12; uncommon at sugar.
" *ultronia*. July 8; common at sugar.

Catocala amatrix. July 18 to October; uncommon at sugar.

" *ilia*. July 3; scarce at sugar.

" *cara*. September 20; scarce at sugar.

" *concumbens*. July 31 to October; not common at sugar.

" *coccinata*. July 18; one at sugar.

" *neogama*. July 19 to October; common at sugar.

" *paleogama*. July 27; not common at sugar.

" *subnata*. July 20 to October; not plenty at sugar.

" *piatrix*. August 8 to October; common at sugar.

" *serena*. August 12; one specimen at sugar.

" *antinympha*. July 22; one specimen at sugar.

" *habilis*. July 30 to October; common at sugar.

" *Clintoni*. July 5; scarce at sugar.

" *polygama*. June 28; very common at sugar.

" *cerogama*. July 21 to October; very plenty at sugar.

" *androphila*. July 24; one at sugar.

" *epione*. August 3; one specimen at sugar.

" *obscura*. August 6 to October; common at sugar.

" *desperata*. August 5; very common at sugar.

Homoptera Saundersii. June 13 until cold nights in October, at sugar; common; one taken in grass May 20 in very worn condition; hibernated (?)

" *edusa*. September 7; one taken at sugar.

" *lunata*. September 8; rare at sugar.

" *nigricans* (*Ypsia undularis*). May 28 to August; at rest and at sugar.

Zale horrida. June 7; not uncommon at sugar.

Homopyralis tactus. July 25; scarce at sugar.

Pseudotnodes vecors. July 14; one taken at sugar.

Zanclognathæ cruralis. July 10; scarce at sugar.

" *laevigata*. July 3; rare at sugar.

Platyhyphenæ scabra. July 28; infrequent at sugar, and very plenty in meadows in daytime, in autumn.

A few moths belonging to succeeding families of *Heterocera*, and some insects from nearly every Order are found on bait at night, and also butterflies belonging to the genera *Vanessa* and *Grapta*, in daytime. The large Tree Toad (*Hyla versicolor*) was observed a few times clinging to trees beside the bait, enjoying a midnight feast, no doubt, as well as the

common Toad (*Bufo Americanus*), which in several instances was seen stationed half concealed in the mulching at the foot of the tree just under the bait.

Coleoptera is next to Lepidoptera in abundance at bait, and I therefore venture to append a list of species seen at sugar.

<i>Calosoma calidum.</i>	<i>Asaphes memnonius.</i>
<i>Dromius piceus.</i>	<i>Cyphon pallipes.</i>
<i>Calathus gregarius.</i>	<i>Photinus ardens.</i>
<i>Platynus molestus.</i>	<i>Podabrus diadema.</i>
<i>Pterostichus Sayi.</i>	<i>Elaphidion parallelum.</i>
<i>Harpalus caliginosus.</i>	<i>Monohamnus confusor.</i>
“ <i>pensylvanicus.</i>	<i>Saperda tridentata.</i>
“ <i>fallax.</i>	<i>Merinus lævis.</i>
<i>Peltis surinamensis.</i>	<i>Centronopus calcaratus.</i>
<i>Megalodacne fasciata.</i>	<i>Xylopinus saperdioides.</i>
<i>Pityophagus 4-guttatus.</i>	<i>Tenebrio molitor.</i>
<i>Adelocera marmorata.</i>	“ <i>tenebrioides.</i>
<i>Agriotes mancus.</i>	<i>Hymenorus obscurus.</i>
<i>Melanotus communis.</i>	<i>Pyrochroa femoralis.</i>
“ <i>parumpunctatus.</i>	“ <i>flabellata.</i>
<i>Corymbites sulcicollis.</i>	

OBNOXIOUS PESTS—SUGGESTIONS RELATIVE TO THEIR DESTRUCTION.

BY DR. H. HAGEN, CAMBRIDGE, MASS.

The question how to check the ravages of obnoxious insects is a very important one, and I am very often asked for advice in special cases. While occupied with a close examination of the proposed remedies and looking through a large number of scientific tracts, some of them fell into my hands and induced me to study them again. The present communication is the result of those studies.

Somewhat more than twenty years ago the lower forms of some fungi attracted the attention of many students, and especially of Dr. Bail, of Prussia. The reports of his observations are scattered in different peri-

odicals, and the final result of my study of those reports was the conviction that a remedy for insect pests, offering several prominent advantages, could be found in the easy application of the yeast fungus. Further, that this remedy could be used probably against the famous Colorado grasshopper, for the destruction of which the Government has appointed a commission appropriated with \$75,000; also, that the remedy could be tried in an easy way against the obnoxious hairy caterpillars, against the potato bugs, and last, but not least, in every greenhouse against leaf lice and similar pests.

Dr. Bail asserts that he has proved by many skillful experiments that four species of microscopical fungi are merely different developments of the same species. One of them, the fungus of the common house-fly, is the vexation of every housekeeper. The dead flies stick in the fall firmly to the windows, or anywhere else, and are covered by a white mould not easy to be removed. The second is the common mould, known to everybody and easily to be produced on vegetable matter in a damp place. The third is the yeast fungus, a microscopical species and the basis of the work done by yeast of fermentation. The fourth is a small water plant, known only to professional botanists. Dr. Bail contends that the spores of the fungus of the house-fly develop in water in this last species, out of water in mould, and that the seeds of mould are transformed in the mash tub into yeast fungus.

The experiments made by Dr. Bail cover a period of more than a dozen years, since the numerous objections which were made against his results induced him to repeat again and again his experiments in different ways. I am obliged to state that even now prominent botanists do not accept Dr. Bail's views, which he maintains to be true and to be corroborated by new and sure experiments. This question, important as it may be for botanists, is without any influence regarding my proposition, as Dr. Bail has proved that mould sowed on mash produces fermentation and the formation of a yeast-fungus, which kills insects as well as the fungus of the house-fly. I was present at the lectures of Dr. Bail before the association of naturalists, in 1861, which were illustrated by the exhibition of mould grown on mash, on which the fungus of the house-fly had been sown, and by a keg of beer brewed from such mash, and by a cake baked with this yeast. Both productions were declared perfect by all who tasted them—an experiment in which I did not feel obliged myself to join, as both are to be had prepared without the fungus of the house-fly.

In a later communication Dr. Bail states that the use of mould has been the secret in brewing formerly certain kinds of a strong and well-reputed beer.

For the so-called jopenbier in Danzig the mash was not used before the forests of mould grown on its surface had sunk to the bottom—or, in other words, till the spores of the mould were sown by themselves on the mash.

Dr. Bail has proved by numerous experiments that healthy insects brought in contact with mash and fed with it are directly infested by the spores of the fungus with fatal consequence. These facts, not belonging strictly to the main part of his experiments, were observed first by chance and later on purpose. The most different insects, flies, mosquitoes, caterpillars, showed all the same results. The experiments were made in such a delicate manner that a small drop of blood taken with an oculist's needle from the abdomen of a house-fly left the animal so far intact that the same operation could be repeated in two days again. Both drops examined with the microscope proved to be filled with spores of fungus.

More to the point are epizootics produced by this fungus and observed on insects in the open air.

A really pestilential epizootic of the common dung-fly was observed in 1867. Not only those, but many other insects, died in the same locality and in the same manner; also other species of flies and gnats, the caterpillars of moths and of Phalænids, and the common hairy caterpillars of a moth which is very nearly related to the famous hairy caterpillar of the Boston Common. Of some species the destruction was so complete that the next year they were very rare. During those years the caterpillars of two species of moths had destroyed pine forests belonging to the State and valued at several millions, and a larger calamity was imminent, when suddenly all caterpillars died from the same fungus.

Similar observations have been made in other places in Europe and here. Mr. Trouvelot formerly began in Medford, Mass., the raising of the *Polyphemus* moth for silk, and was successful enough to get a prize in the Paris Exhibition of 1867. Unfortunately he brought home from Paris eggs of another species from China, and purported to be superior for silk-raising in the open air. Those eggs proved to be infested by fungus, and the caterpillars hatched from them died, but not those alone. All caterpillars of the *Polyphemus* moth became infested, and even most of the other indigenous species living on the twelve acres of shrub land

which Mr. Trouvelot utilized for this purpose, died rapidly. After two years of a similar calamity, Mr. Trouvelot was obliged to stop his experiments, which might have developed, perhaps, a new source of wealth for this country. A similar pest of an indigenous species of moth stopped only last year the interesting observations of Mr. Siewers in Newport, Ky.

The common silkworm in Europe has been in recent times extensively affected by a sickness called muscardine, which is also the consequence of a fungus. Similar fatal epizootics have been observed on the honey bee, and in Brazil several years ago nearly all the bees died from this cause. In Entomological journals are reported fatal epizootics of leaf lice, of grasshoppers, of the cabbage butterfly and of the currant worm, both imported here only a few years ago, and both very obnoxious.

Considering those facts, which are doubtless true, and considering the easy way in which the poisonous fungus can always and everywhere be procured and adhibited, I believe that I should be justified in proposing to make a trial of it against insect calamities. Nature uses always to attain its purposes the most simple and the most effectual ways ; therefore it is always the safest way to follow nature.

Beer mash or diluted yeast should be applied either with a syringe or with a sprinkler ; and the fact that infested insects poison others with which they come in contact will be a great help. Of course it will be impossible to destroy all insects, but a certain limit to calamities could be attained, and I think that is all that could reasonably be expected. In greenhouses the result would probably justify very well a trial, and on currant worms and potato bugs the experiment would not be a difficult one, as the larvæ of both insects live upon the leaves, which can easily be sprinkled. But it seems to me more important to make the trial with the Colorado grasshopper. I should recommend to infest the newly-hatched brood, which live always together in great numbers, and I should recommend also to bring the poison, if possible, in contact with the eggs in the egg-holes, to arrive at the same results, which were so fatal to Mr. Trouvelot's silk-raising. After all, the remedy proposed is very cheap, is everywhere to be had or easily to be prepared, has the great advantage of not being obnoxious to man or domestic animals, and if successful would be really a benefit to mankind. Nevertheless, I should not be astonished at all if the first trial with this remedy would not be very successful, even a failure. The quantity to be applied and the manner of the application can only be known by experiment, but I am sure that it will not be diffi-

cult to find out the right method. I myself have more confidence in the proposed remedy, since it is neither an hypothesis nor a guess-work, but simply the application of true and well-observed facts. I hear the question—When all this has been known for so long a time, why was it not used long ago? But is that not true for many, not to say for all, discoveries? Most of them are like the famous Columbus egg.

OBSERVATIONS ON NEPHOPTERIX ZIMMERMANI.

BY D. S. KELLICOTT, BUFFALO, N. Y.

This pine-boring Pyralid was described by Prof. A. R. Grote in a paper read at the Nashville Meeting, 1877, of the American Assoc. for the Adv. of Science, and published in CANADIAN ENTOMOLOGIST, vol. ix., 161. During the summer and autumn of 1878, and again this year, I have made some observations upon the occurrence, larval habits and parasitic enemies of this moth, and am able to state concerning them some additional facts of interest.

The moth, it appears, is pretty widely spread, and it seems rather odd that it should not have been discovered until 1877, having been overlooked by our excellent economic Entomologists. I have met with it in some one of its stages in the following localities: It occurs not uncommonly in both foreign and native pines in and about Buffalo; many of the trees of this species in the Niagara St. Parks have been bored by it. I found it quite abundant in small white pines of the forest at Chehtowaga, Erie Co., N. Y. At this place I found many plants had been dwarfed and ruined by their ravages. It also occurs, to what extent I am unable to say, at Hamburg and Clarence Center, in the same Co. I recently visited a portion of this State, Oswego Co., formerly clad to some considerable extent with white pine, and there are yet standing some virgin forests of this splendid tree. In divers places in that county I found our borer; it is so abundant in one locality, at least, that it proves a grave enemy to the young pines of second growth where the primitive trees have been removed by the lumberman. There is near Hastings Center an "old slash" in which at least one-half of the many such small pines have been

injured; indeed, in one neglected corner, among scores, scarcely one tree had escaped. In this instance, also, many pines were stunted, while some thus weakened had been broken off by the wind. In other localities where the pine is indigenous I have been unable to find it, or else it was only occasional; for example, at Portage, where young pines are plentiful, and although the trunks bore masses of pitch closely like those from the wounds by *Zimmermani*, yet a diligent search discovered but one pupa skin, and of the identity of it I am not quite certain, as it was badly broken in removing from the pitch.

April 12th last, at Hastings, I took many larvæ of various sizes from .25 to .7 of an inch in length when crawling, so there is no longer a doubt as to the winter stage. None of those taken were "livid or blackish green," but dull white; nor do the hairs arise from a "series of black dots," but from light brown ones. I take it to be a case where a naked hibernating larva is lighter than during the warm summer. Otherwise the caterpillars were as described by Mr. Grote.

In a clump of pines whose trunks were from 6 in. to 1 ft. in diameter many of the larger ones had been "boxed," i. e., inclined incisions had been cut by the axe through the sap-wood in order to catch the pitch exuding from the wound. Around the borders of these "boxes" the galleries with both pupa skins and living larvæ were plentiful. It appears that the larva cannot penetrate the outer bark of other than quite tender trees; nor could I find evidence of their attacking the branches of larger trees, although I had opportunity to examine such that had been felled during the winter just past. Since this larva so readily takes advantage of a wound, may it not stand related as a *messmate* to other borers? At both Chehtowaga and Hastings I found on trunks in the same neighborhood masses of exuding pitch in which were larvæ of an orange color, attaining a length of .45 of an inch, remaining through the winter, and going into pupa towards spring, as I found them in both conditions April 12th and early in May. These larvæ are those of one of the *pine weevils*. It appears to me that *Zimmermani* may and does take advantage of these wounds by the weevil, as it does of those made by the axe.

I have found the moth's galleries in both trunk and branch, both above and below the whorls (usually below), sometimes completely girdling the stem, thus killing the portion above; in one instance I found a gallery passing from one whorl to the one above.

Now, when the moth borer and the weevil work together and pretty much in the same way, i. e., by cutting the inner bark and the cambium layer, thus scoring and girdling the stem, to which culprit belongs the greatest amount of credit for mischief? Both are guilty of enough to justify everlasting execration.

It remains to add a word about its insect enemies. The hymenopterous parasite which Mr. Grote found to fill certain of the chrysalids, I have found in every location where the moth is at all abundant; there is another which I have found quite as abundant. Early in April I obtained from the galleries of last year a number of brown cocoons, about .4 of an inch long, nearly cylindrical, ends rounded, texture thin papery, pupa visible through the cocoon. The skin and head of the victim was found at one end of this cocoon, showing that the caterpillar was the host.

In a few days there appeared from each cocoon a lively fly. Expanse of male .6 in., of female .7 in. Color above black, legs yellow, underside of abdomen white with a row of black dashes on side, front of male white, of female black. A white line on shoulder of each extends on to the costa. Ovipositor as long as the abdomen.

I shall presently refer the species for identification.

ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Annual Meeting of this Club will be held at Saratoga, N. Y., on Tuesday, August 26th, at 2 p. m. All Entomologists are invited to meet with the Club. A series of interesting meetings is expected to be held during the week.

B. PICKMAN MANN, Secretary.

[The place of meeting this year being so central and easy of access, it is expected that an unusually large number of Entomologists will be present. It is hoped that all will come with copious notes and with memories well stored with personal recollections of insects and their habits, so that a large mass of useful information may be submitted. The discussions at these yearly meetings are always of very great interest, while the social charms attending such a reunion of kindred spirits add greatly to the pleasures of the occasion.—ED. CAN. ENT.]

DESCRIPTION OF A NEW SPECIES OF MELITAEA
FROM TEXAS.

BY W. H. EDWARDS, COALBURGH, W. VA.

Melitaea Fulvia.

Male.—Expands 1.5 inch.

Upper side brown-black over basal area of each wing, somewhat dusted with fulvous ; or the ground color is partly replaced by fulvous, especially in the cells ; the costal margin and apex of primaries black, and both hind margins are narrowly edged by black ; all the nervures and branches black ; remainder of wings fulvous ; both have a submarginal series of fulvous spots, preceded by a black line, those of primaries at apex replaced by yellow, or obsolete ; beyond the black line a complete common series of small yellow spots ; a second on the disk, larger, and on secondaries elongated, sometimes very much so, and more or less confluent with the spots of the outer row ; on primaries a large yellow spot, edged with fulvous, next inside arc of cell, and two or three small yellow spots below this ; in cell of secondaries a small similar spot, but sometimes wanting ; fringes alternately and equally black and white.

Under side of primaries pale orange fulvous, the light spots of upper side on disk and towards base showing not very distinctly ; so also the spots of extra discal row below median, but above and to costa these are distinct and clear yellow-buff ; next apex the marginal row offers four yellow-buff spots, and there is another at inner angle, the remainder being fulvous, and confluent with the ground color of disk ; secondaries wholly yellow-buff, the nervules broadly edged with black, and the hind margin as well as costal and inner margins edged with a narrow black border ; across the extra discal area a black band, within which are six or seven small yellow-buff spots ; and the spots next margin, cut off by this black band, are large and sub-rectangular ; in the cell a V-shaped black stripe, pointing toward base, one limb of which is in line with the second branch of median ; there is also an additional stripe running through the sub-median interspace. Body black above, the rings of abdomen yellow at junction ; beneath, the thorax yellow-buff, the abdomen yellow with more or less fulvous ; legs fulvous ; palpi yellow, nearly white at sides, black in front and at tip ; antennæ black on upper side, ringed with yellow, ferruginous below ; club black.

Female.—Same size. The fulvous shade predominates, only the apex and costal margin of primaries and both hind margins being black ; the yellow markings as in male, but indistinct. On the under side the markings of disk and at base are almost obliterated, but the outer rows of yellow spots are plain ; secondaries as in the male.

From several examples taken by Mr. Jacob Boll in Western Texas, in March, 1879. I formerly received a female taken by Mr. Morrison in So. Colorado. The species is allied to *Leanira* Bois.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KY.

GRACILARIA.

G. fasciella Cham.

G. 5-notella Cham.

With ten specimens of *fasciella* and two of *5-notella* before me, with scarcely a trace of variation in the ten, but with the two differing from each other somewhat and both differing very decidedly from the ten, I had no doubt as to the distinctness of the two species. A larger series, however, induces the belief that they belong to the same species. The difference between them may be thus stated: In *fasciella* the base and apex of the fore wings are brownish-gray, and between these portions are three brownish-gray and four white fasciæ, all very distinct and well defined. In *5-notella* the whole dorsal half of the wing is white ; there is a small brown spot on the base of the costal margin, another further back, and still further back another which in the middle of the wing is produced backwards to the gray-brown apical part of the wing, which encloses two small white costal streaks. A larger series, however, shows that the two forms vary into each other, and induce the suspicion that Dr. Clemens described his *G. fulgidella* from a form like *5-notella*. The tuft on the second joint of the palpi is minute, and in all of my specimens but two it has been removed in pinning.

G. Packardella Cham.

In this species there is great range in the intensity of the purplish tinge. Some specimens might be described as having it so strongly developed as to ally them to *purpuriella*, *stigmatella*, etc., while in others it is very faint and delicate, the ground color of lemon yellow not being at all obscured by it. It is, however, allied to *superbifrontella* and *Sweederella*, etc., more closely than to any other known species.

G. inornatella Cham.

This must be dropped from the list, as I am satisfied that it was described from worn specimens of *G. Packardella* and *superbifrontella*.

G. purpuriella Cham.

Since the last notice of this species was written I have bred it from larvæ feeding on the Silver-leaf Poplar ; but I have never met with it on the Weeping Willow, though it is common enough on many of our native Willows. It may prove to be the European *G. stigmatella*, which feeds on Sallows. It is certainly very near that species.

CORRESPONDENCE.

The present season has so far been as unfavorable for the collection of Lepidoptera as was the same period last year, and very few butterflies have been taken or observed, although diligently sought for. The recent "hot wave" will have the effect of bringing them forth, and as other insects are abundant, there has been no excuse for idleness. I have added numerous specimens to my collection of Coleoptera, paying particular attention to the Buprestidæ and two or three other families. The Buprestidæ are well represented here, over twenty species having been taken by me last year, and more than half of the same this season, with the addition of one or two new ones, such as *A. striata* and *Brachys ovata*. Since the middle of May *C. virginensis* and *C. liberta* have been more or less plentiful on the pines, but not in such numbers as in the autumn ; those at present found are chiefly pairs copulating. One chief object of my attention has been the beautiful little green *C. Harrisii*, of which I have taken several specimens on the Quebec side of the river since the 3rd inst. After repeated search I have also found it on this side, as has Mr. Fletcher since. Has it been hitherto noted as captured in Ontario ? At present different species of *Monohammus*, as *confusor*,

scutellatus and *dentator*, are to be found on the pines also, and are noticed gnawing the bark on twigs and semi-girdling them, while the trees are disfigured by many old scars caused by similar operations in former years. In the evenings numbers of them come flying heavily, but strongly, across the river, and lodge often upon the Parliament Buildings, causing some excitement to nervous promenaders on the Hill. The popular name for *confusor* is "Ottawa cow." Colorado beetles are reported to be doing less damage, and have been thinned out by Paris green, but their co-workers the blister beetles (*E. cinerea*) are unusually abundant in the woods, and a new foe is reported by one of our market-gardeners, who brought four insects to a friend of mine, stating that they were, in immense numbers, destroying his plants and flowers, having been first noticed on wild *Convolvulus*. I found them to be *Chelymorpha cribraria*, but was not aware that this beetle occurred in any number or was known to be very injurious. At the joint excursion held by the Natural History Society of Montreal and our Field Naturalists' Club, on the 12th inst., at Calumet (half way between here and Montreal), I was somewhat disappointed to see comparatively little interest taken in Entomology, Botany seeming to almost monopolize the workers. I had looked forward to meeting some fellow-laborers among the Montrealers. My "take" during the day was but an average one, containing neither very many nor very rare specimens, about the only novelty being *Cicindela longilabris*, which I have not seen around here yet. I have been using a beating net made according to description by Dr. Bailey in last year's ENTOMOLOGIST, and find it an admirable instrument.

Ottawa, 30th June, 1879.

W. HAGUE HARRINGTON.

On the 11th May last, while on the Island at Toronto, a fine specimen of *Papilio thoas* flew past at a distance of not more than eight feet from me, but as I was in a marsh I had no opportunity to capture it. Being quite familiar with *turnus* alive, and with both species mounted, there is no doubt at all in my mind about the identity of the specimen in question. The butterfly was flying north when first observed, and continued in the same direction as long as it could be seen. The appearance of this butterfly at so early a date would seem to indicate that the species is double-brooded here, unless it can be shown that the escape of the imago from some of the chrysalids of the same brood is much earlier than from others.

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No. 7

ON CECIDOMYIA LEGUMINICOLA, N. SP.

BY J. A. LINTNER, N. Y. STATE MUSEUM NAT. HIST., ALBANY.

Cecidomyia trifolii, CANADIAN ENTOMOLOGIST, vol. xi., p. 44. 1879.

I am indebted to Dr. Hagen, of Cambridge, Mass., for the information that the name which I had selected for the clover-seed fly was preoccupied by Franz Loew, in *Verhandl. Zool. Bot. Gesell., Wien*, 1874, vol. xxiv., where he describes (p. 142) the male and female, larva, pupa and gall of a species occurring in a folded leaf of *Trifolium pratense*, and figures (pl. 2, f. 4) the deformation of the plant. I therefore propose the name of *C. leguminicola* for the American species, the larva of which inhabits the clover legume.

Bremi, in his *Monograph of the Cecidomyiæ*, 1847, p. 29, may possibly refer to Loew's species when he states: "I observed in the same place [with *Ranunculus bulbosus*] on the leaves of *Trifolium pratense*, similar cornucopiæ but less regular; as in some leaves only the tip was rolled (pl. 2, f. 34), and of others similar to a pod. The development was not observed, and as I supposed it identical with *Cecid. ranunculi*, I accept them as a variety of that species."

Another species may infest the clover in Europe, if the statement made by Perris, in *Ann. Soc. Ent. France*, 1870, p. 179, be reliable. He states that in the tips (*extrêmes tiges*) of *Trifolium subterraneum* are to be found larvæ of a *Cecidomyia* (imago unknown). Fr. Loew, in a notice of these larvæ (*Wien Z. B. Gesell.*, 1876, p. 92), remarks that perhaps they were only *inquilines*, and that the deformation described by Perris may have been made by Acari.

The above references have been kindly communicated to me by Dr. Hagen.

From the inquiries and examinations thus far made, it is very probable that our *Cecid. leguminicola* does not occur in Europe. Baron Osten

Sacken has informed me that they have there a *Cecid. Loti*, infesting the heads of Lotus and Medicago, but that the larva as described by Winnertz seems different from ours, judging from the description given by me. Dr. Hagen compares our species with the European *Cecid. sysymbrii*, in its form and venation.

I have recently been successful in obtaining examples of the imago of *Cecid. leguminicola*, unknown to me at the time of my description of the larva. Anticipating failure (since realized) in my efforts to rear it from the larvæ obtained by me last year, I applied, in May last, to Mr. R. J. Swan, of Geneva, N. Y., who at the Annual Meeting of the N. Y. State Agricultural Society, in January, had spoken of the occurrence in very large numbers of the larvæ in a clover field upon his farm, requesting that some of the surface soil from the field might be collected and forwarded to me. A small box of the earth (containing also some of the clover roots) of about six inches cube, was received by me on the 2nd of June, and spread out in a glass-covered case. On the following morning a male and female, *in copula*, were found in the box. Additional examples were disclosed from the earth—about twenty-five in all—from that time to the 27th of June, since when none have been obtained. They had undoubtedly commenced to emerge during the month of May.

The insect is a true Cecidomyia, and belongs to Section I, subsection A of Winnertz' arrangement as defined in Osten Sacken's paper on the N. A. Cecidomyiæ in Loew's *Monograph of the Diptera of North America*, Part I., viz.: I. Wings with three longitudinal veins, the third either forming a fork or becoming more or less obsolete toward the tip. A. Cross-vein placed between the root and the tip of the first longitudinal vein (in this section the cross-vein is frequently almost obsolete).

The neuration is shown in fig. 1, p. 174 of Loew's *Monograph*.

Marked features of the species, which will serve in its recognition, are the genitalia of the male, which are quite broad, projected on a pedicel, and arranged in an extended pair of clasping organs; and the long jointed ovipositor of the female, of about twice the length of the abdomen.

The antennæ of the Cecidomyiæ afford perhaps the best features for determination of species. The following description of the antennæ of the male of *C. leguminicola* was drawn from fresh specimens just after death:

Number of joints seventeen in all—the basal one colored and short, the next one black, short and naked, followed by fifteen verticillate ones.

Joints on peduncles as long as the joints, subcylindrical with rounded ends, about one-half longer than broad, rather thickly verticillate; the longest hairs nearly three times as long as the joints, and projected at nearly right angles to them; the shorter hairs about equal in length to the joints, some of which curve upward and have their tips nearly in the plane of the succeeding joint; joints regularly and gradually diminishing in size to the terminal one, which is about but one-half the size of the penultimate one, and of an ovate form.

The wings are clothed with numerous short, curved, blackish hairs, which give them a dusky appearance; ciliae paler, long. The abdomen is fuscous, marked on each segment dorsally with black hairs forming a segment of a circle having the curve in front. The thorax is black above, clothed with rather long hairs.

The insect is in all probability quite generally distributed throughout the State of New York, and will be found in adjoining States. On the 1st of July, examples of the larvæ were obtained from clover heads gathered by me on Mount Equinox, Vermont, at an elevation of 2,500 feet above tide. On July 5th, although a late period for the larvæ, mature specimens were taken from clover growing within the city of Albany, from the sidewalk of Western Avenue. The only example of the fly which has up to the present, so far as my knowledge extends, been taken at large, was captured on the Hudson River, in the vicinity of Castleton, on the 16th of the present month (July), by Mr. Dempster A. Lansingh, of Albany. The keen eye that could detect so minute an object on the crowded deck of an excursion boat, deserves to be trained for use in entomological science.

From information kindly communicated to me by Prof. Wm. H. Brewer, of Yale College, New Haven, Conn., it is very probable that the existence of this clover pest was known at least thirty years ago. He writes as follows:

"My father, Henry Brewer, of Enfield Center, Tompkins Co., N. Y., was an enthusiastic grower of clover and clover-seed as far back as I can remember. Many years ago—how long, I cannot definitely say, but certainly before 1848, it was known to us that an insect attacked the clover, which hatched out a fly. Our belief then was, that the larva existed *within the seed*. On two occasions I hatched out the flies and sent them by mail to Albany, to the Entomologist there—once before 1848, and once later, somewhere between 1851 and 1855. The fly was very small

and very slender, but having been found so many years ago, that is all the recollection I have of it. The clover heads were not affected externally by its presence."

There cannot be much doubt but that the above insect is identical with the little midge which has so recently commanded our attention, as the result of its multiplication, or, as is more probable, from a period of its unusual abundance. Accepting their identity, it is quite interesting that the first notice of the species, so far as known, comes from a county which is believed to be suffering more from its depredations, at the present time, than any other portion of the State.

From the July number of the *American Agriculturist*, I learn, for the first time, that Prof. Riley has been engaged in investigations on this interesting insect. The article is drawn from a conversation with Prof. R., and in part from a communication by him a short time ago to the *N. Y. Tribune*. It contains a notice of the depredations, transformations and appearances of the midge, and is accompanied by excellent figures of the male and female with enlargements of parts, which will be of great service in its identification.

CONTRIBUTIONS TO THE COLLECTION OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

Through the kindness of Mr. O. S. Westcott, of Racine, Wis., our cabinets have lately been enriched with a number of named Orthoptera, some 25 species in all; also 13 species of Lepidoptera which were short or entirely wanting in our collection.

Mr. G. R. Pilate, of Dayton, Ohio, has also sent us some very beautiful things, including over 300 specimens of Coleoptera and 29 of Lepidoptera, a large proportion of which are distinct species and quite a number of them new to our collection. We are greatly indebted to these gentlemen for their kindness in this matter, and herewith tender them our sincere thanks.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KY.

ADELA.

A. biviella Zell.

I have received both sexes of this species from Prof. Fernald, of Orono, Maine. It is a prettier species than *A. bella* Cham., with the fasciæ much more distinct. Zeller describes only the ♂. It has the head and palpi dark brown with a very faint purplish tinge; the antennæ with annulations of dark purple and silvery white; the body and legs dark purple, the legs annulate with white; hind wings pale purplish with darker ciliæ; thorax and fore wings rich deep purple, appearing in some lights to be thickly dusted with brightly scintillating golden scales; behind the middle of the fore wings is a straight white fascia widest on the dorsal margin, dark margined before, and more faintly so on the costa behind; before the apex is another fascia which does not quite reach the dorsal margin and which is dark margined before. Zeller represents this fascia as having a sigmoid outline, but in one of my specimens it is perfectly straight and in the other scarcely perceptibly sigmoid. *Al. ex.* 7 lines.

The ♀ (a single specimen), now first described, differs only in having the hairs of the head straw yellow, those of the palpi whitish, and the second fascia reduced to a very short white costal streak.

The antennæ are simple in both sexes.

A. bella Cham.

The fasciæ in this species are as stated in the original description in the apical part of the wing, only visible in certain lights and are very indistinct even then; perhaps it would be more correct not to describe them as fasciæ, but to say that the apical part of the wings is somewhat suffused or overlaid with golden, except three or four narrow indistinct transverse lines, which are of the general hue. In the ♀ the basal half of the antennæ are densely clothed with long scales.

Dictæ (Adela) corruscifasciella Cham., CAN. ENT., v. 5, April, 1873.

A. Schlægeri Zell., Bei. z. Kent, May, 1873.

In my judgment the characters of this and similar species are sufficient to distinguish them generically from *Adela* as represented by such species

as *A. bivittella*, *trigrapha*, *bella*, etc. Prof. Zeller's figure and description leave no doubt as to the identity of the species described so nearly at the same time respectively by him and by me.

ANTISPILA.

A. ampelopsiella Cham.

In Vol. 6 I have given this name to a mine and larva found in leaves of *Ampelopsis quinquefolia*, the imago being then unknown. I have also, *loc. cit.*, described a species bred from Grape leaves, without naming it, because I thought it probable that it would prove to be *ampelopsiella*. Since then I have bred it both from *Ampelopsis* and from Wild Grape leaves (*Vitis cordifolia*), and it proves to be the same species described in Vol. 6. The description, however, is imperfect, having been prepared from a single slightly worn specimen.

A. hydrangeælla Cham.

This species was also named from the larva and mine only. I have since bred it. It is a little larger than *ampelopsiella*, though scarcely so large as *isabella* or *viticordifoliella*, and is perhaps the prettiest species of the genus. The palpi and tips of the antennæ (last five joints), and the under side of a few of the basal joints snowy white. Head, thorax, abdomen, inner surface of legs, hind femora, and tibial spurs of hind legs, like burnished steel; tarsi of anterior and middle legs and tips of hind tarsi yellowish white, posterior tibiæ on outer surface and tarsi, except the tips, purplish with metallic reflections; anterior wings and a spot on each side of the thorax bronzy brown, without greenish reflections; ciliæ purple tipped with silvery gray. The fascia, costal and dorsal streaks and apical spot are brilliant silvery; the fascia is not constricted on the fold and the streaks are placed as in the other species; the costal spot is small and the dorsal large and almost an exact triangle, being, however, a little widest on the base and the margins very faintly concave. Hind wings and ciliæ pale purplish fuscous.

It thus differs from *ampelopsiella* in having the tips of the antennæ white and in other minute particulars. The case in which it pupates is elongate and narrow, a long ellipse; that of *ampelopsiella* is a short and wider ellipse, that of *viticordifoliella* is nearly oval, that of *isabella* a very wide oval, almost circular, and that of *cornifoliella* is smaller than that of

isabella, though resembling it more in shape than that of *viticordifoliella*, which is nearer to it in size. That of *nyssæfoliella* I have not seen. It requires careful observation to distinguish the species. They are more readily distinguished by their cases than by the marks of the imago; *hydrangeacella* and *ampelopsiella* may be distinguished at once from the others by the possession of the apical spot, but they require close observation to distinguish them from each other. So likewise do *isabella*, *nyssæfoliella*, *cornifoliella* and *viticordifoliella*; *cornifoliella* and *isabella* are, however, of a duller darker brown than the other two, and *viticordifoliella* likewise has white annulations towards the tips of the antennæ.

I have not seen any of the European species, but comparing our species with the figures of *Pfeifferella* and *Treitschkiella* in Nat. His. Tin., vii., the latter are much paler or lighter in color than our species.

NOTES UPON THE PREPARATORY STAGES OF CERTAIN SPECIES OF BUTTERFLIES. NO. I.

BY W. H. EDWARDS, COALBURGH, W. VA.

I have in my note-books descriptions of one or more stages of several species, of which no part of the life-history has hitherto been published, and I propose, with the permission of the Editor, to give them in a series of three or four papers.

I. ERESIA TEXANA, Edw. (*Cincta*, Edw., *Smerdis*, Hewn.).

On 13th Sept., 1878, I received from Mr. J. Boll, Texas, a lot of newly-hatched larvæ. The eggs were laid in cluster upon the leaf of *Diclipa*, on 7th Sept., and were immediately mailed to me, arriving five days after. Nearly all the plant had withered, but there was a little green about the flower-heads, and the larvæ fed upon this till it was consumed. I put in the glass with them leaves of *Aster*, on which *Tharos* and *Nycteis* feed; of *Actinomeris squarrosa*, on which *Nycteis* feeds, and *Chelonia barbata*, the food of *Phaeton*, but for some days the larvæ refused all and most of them died. About a week after their arrival I found the few survivors were eating *Actinomeris*, and thenceforth

I had no difficulty. The first moult escaped me, the second occurred 25th Sept., the third 6th Oct., the fourth about 15th, and the first chrysalis formed 21st Oct. The butterfly emerged 8th November. The resemblance to genus *Phyciodes*, especially to *P. Tharos*, was close in all stages. I doubt if *Eresia* and *Phyciodes* are properly more than groups of one genus.

YOUNG LARVA.—Length .08 inch ; cylindrical, of even size, the segments well rounded ; color greenish-brown ; on dorsum four rows of pale-colored flattened tubercles, from each of which springs a long black hair, curved forward ; head larger than body, reddish-brown ; shape sub-ovate, bilobed.

After second moult.—Length .17 inch ; dorsum and upper part of side brown, the lower part and under side yellow-green ; furnished with seven rows of spines, one dorsal, three lateral, each spine stout, broad at base, tapering to a blunt point, and thickly set with short brown bristles ; the dorsal spines, and the tubercles from which they spring, greenish ; those of first lateral row black ; the two lower rows greenish ; over the feet is a row of minute spines with bristles, all greenish ; head sub-cordate, the vertices rounded ; color dark brown, shining.

After third moult.—Length .26 inch, same shape ; color dark brown, specked with blue-white ; the lower part of side greenish-white, finely marked with brown ; on the lower side of second lateral spines is a longitudinal black stripe, only found on the middle of each segment ; all the spines dark brown except the lower laterals and the minute ones over feet, which, as well as their bristles, are greenish-white ; head as before, bronze-brown.

After fourth and last moult.—Length .6 inch.

MATURE LARVA.—Length .7 inch.

Color yellow-brown, the dorsum and upper part of side much specked with dull white ; running with first laterals is a whitish line, and just below a black stripe, broken at the joints of the segments ; along the base of body, embracing the spiracles on its upper edge, is a broad dull white band, mottled with greenish and brown ; the lower lateral spines on this band, and the spines over feet, greenish-white ; all others brown ; head sub-cordate ; the vertices rounded, smooth, brown.

CHRYSLIS.—Length .5 inch ; cylindrical, the abdomen stoutest ; head-case short, bevelled at the sides, nearly square at top, the vertices pyramidal, not prominent ; mesonotum slightly raised, rounded, followed by

a shallow depression; on the abdomen three rows of small tubercles, corresponding to the larval spines of dorsal and first lateral rows; the latter continued to mesonotum, on which they are larger than elsewhere; color dark brown, specked with buff; or sometimes light brown, specked and streaked with darker; the head and wing cases clouded with olivaceous; about the hind margins of the wings two parallel rows of whitish points; the tubercles yellowish, but on the anterior side mostly black.

2. *PHYCIODES VESTA*, Edw. The butterfly figured in *But. N. A.*, Part 7, Vol. 2.

CHRYsalis: shape of *Tharos*.—Length .4 inch, cylindrical; the wing-cases a little raised above surface; head-case stout, narrow at top and a little convex; excavated at sides; mesonotum moderately prominent, rounded, followed by a shallow depression; abdomen stout, the segments elevated at their anterior edges, and the foremost one quite prominently, as in *Tharos*; on abdomen several rows of fine tubercles, two of which pass to mesonotum; color apparently had been yellow-brown, specked with black and dull white, but the example was dead, and I could not be certain as to the shades of color in life. This was sent me recently by Mr. Boll.

3. *MELITAEA BARONI*, H. Edw.

I received from Mr. Oscar T. Baron, at Mendocino, Cal., about twenty larvæ in hybernation, after third moult, in fall of 1878. Mr. Baron wrote that the eggs were laid 29th June, in clusters, one large and several small ones, besides a few scattered eggs. The large cluster contained 60 or 70 eggs, the small ones from 5 to 20. The larvæ hatched 20th July, or after 21 days. The first care of the young larvæ is to spin a web which covers the whole brood, and they occupy this, enlarging as necessary, till the time for hibernating comes. Then some of the larvæ leave the common web and spin for themselves in the wilted leaves of the food plant. (I infer from this that some of the larvæ still remain in the common web.) Mr. Baron sent me roots of the plant, which I forced in the winter and got weak stems and a few leaves, but eventually all died. The larvæ did not survive the winter, though I treated them as I did the hibernating larvæ of *Nycteis*, which lived. On 18th May, 1879, I received from Mr. Baron quite a number of chrysalids of this species, of which several were in good condition on arrival. From these emerged 6 butterflies.

In 1876, Mr. Baron had sent me living larvæ in tin-box with food plant. They were twelve days on the way in the mail, and but one larva was alive on arrival. Several had made chrysalis in the box, but were eaten, and probably the single larva had lived on the chrysalids. It had barely strength to suspend within a few hours after I opened the box, and died before chrysalis. This shows that caterpillars may be sent great distances per mail. They will live and thrive so long as the leaves remain fresh, and I have frequently received them in good condition after five or six days on the road. *But they should always be forwarded in tin or metal boxes*, as in these the leaves remain fresh several days. The larvæ get plenty of air under the cover of the box, so that it is unnecessary to punch holes therein. *It is useless to send eggs or larvæ in paper or wood even for two or three days*, as the plant dies and the larvæ starve. If eggs are sent, there should always be leaves with them, to supply food in case the young larvæ come forth. I frequently receive eggs or larvæ badly packed, and hence I give these directions. I shall be glad of butterfly eggs or larvæ at any time, and will gladly exchange butterflies for them.

As will be seen above, the resemblance in larval habits of *Baroni* to *Phaeton* is close.

EGG.—Shaped like *Phaeton*; a truncated cone, rounded at base; the lower two thirds smooth, but under a high power seen to be finely grained or pitted; the upper third ribbed vertically.

YOUNG LARVA.—Length .08 inch; cylindrical, the segments well rounded; translucent, greenish-brown; on each segment a transverse row of fine tubercles, giving out recurved hairs; head obovoid, bilobed, the vertices rounded, black.

After first moult.—Length .15 inch; mottled greenish and brown; armed with seven rows of spines (as in this genus), besides a row of minute spines over feet; spines slender, and with black bristles; the dorsal row yellow, as also the small spines over feet; all others black; on 2 a collar of fine tubercles, each of which gives out a pencil of hairs; head sub-cordate, vertices rounded, black, with black hairs.

After second moult.—Length .22 inch; color black; all spines black except dorsal row and the small ones over feet. (These three stages are described from specimens in alcohol.)

After third moult.—Length in hybernation, and therefore contracted, .3 inch; black; spines thickly beset with divergent bristles,

forming a dense covering to the body ; the dorsals and the small spines over feet orange, all others black ; head black.

MATURE LARVA (after fifth moult probably).—Length 1 inch; color velvet-black, dotted with whitish points ; under side smoky-brown ; the dorsal spines yellow, with black bristles, those over feet yellow ; all others black ; feet black, pro-legs brown ; head small, sub-cordate, the vertices a little prominent ; dark brown ; much covered with black hairs.

CHRYSLIS.—Length .6 to .65 inch. Cylindrical ; head case narrow, short, compressed transversely, excavated at sides ; mesonotum not prominent, rounded, followed by a shallow depression ; abdomen stout, furnished with several rows of sharp, conical, rather short tubercles, those of medio-dorsal row standing on the anterior edges of the segments ; the wing cases a little flaring at base, depressed in middle ; color a delicate blue-gray ; of wing cases buff, more or less, but always slightly, tinted with red ; whole surface much marked with black ; on wing cases a black patch extends from base almost to hind margin, the nervules being orange ; the hind margins are bordered by two parallel rows of serrated spots ; the head case is largely black, and the mesonotum also ; the tubercles more or less enclosed by black ; behind those of medio-dorsal row are four small spots forming with the tubercle a triangle, and there are similar spots on sides. Different chrysalids vary in respect to these black markings.

This history of *Baroni* is more complete than that of any other of the Californian Melitæas. The species is the most beautiful of its genus on this continent, the larger part of the under surface of wings being of a brilliant red-lead color. In size and in the appearance of upper surface it is near to *Edithe* Bois.

A SUCCESSFUL MOTH-TRAP.

BY O. S. WESTCOTT, RACINE, WIS.

Many attempts have been made to devise something by means of which to capture the Noctuidæ, but the results have been usually so meagre that the contrivances have been abandoned in disgust. I have been using a contrivance this season which will really abundantly repay

one for the trifling trouble and expense involved in its construction. It consists first of a gallon glass jar, heavily charged with cyanide of potassium. To the top of this is fitted a funnel, the spreading mouth of which opens at right angles to the axis of the poisoned jar. The lower end of the funnel is four or five inches below the mouth of the jar and has an opening three inches in diameter, the funnel mouth being twelve or thirteen inches across. Opposite the mouth of the funnel, and on the opposite side of the jar, is soldered to the funnel a sheet of tin so bent as to thoroughly enclose a lamp. The lamp is supported by a piece of tin *hinged* to the outer edge of this projection. The lamp being placed in position, the tin support is made to rest upon the projecting part of the jar below its neck. Immediately in front of the light is placed a sheet of mica. The whole contrivance is placed within a tight wooden box, and a tin flap is also arranged above the lamp chimney as a precaution against an undesired conflagration.

The moth, attracted by the light, flies into the mouth of the funnel, is stopped by the mica, and after fluttering a very short time, is so far overcome by the fumes of the potassium as to fall within the poisoned jar, whence it cannot emerge. A projecting lip of an inch or so in height is soldered to the lower edge of the mouth of the funnel in such a way as to catch any insect that falls outside the mouth of the jar. It thus is most likely to return to the light. I have taken with this contrivance hundreds of Noctuidae and Coleoptera, among the former many things—especially among the Tineidae—entirely new to my cabinet.

THE TYPICAL COLLECTIONS OF THE DIPTERA OF NORTH AMERICA IN THE MUSEUM IN CAMBRIDGE, MASS.

BY DR. H. HAGEN, CAMBRIDGE, MASS.

The new edition of the Catalogue of the described Diptera of North America, by the Baron Osten Sacken, Washington, 1878, ranges doubtlessly among the most important works published on the North American Fauna. A very detailed and elaborate preface tells only in brief manner the immense amount of work done by the author since the publication of the first catalogue in 1858. A large part of new information is given at the end of the Catalogue in 335 notes.

Being by no means competent to give a scientific record of the work, which contains indeed much more than the names and quotations which are only printed on the pages, I felt it my duty to compare carefully the collections of Diptera in the Museum with the Catalogue.

The collections consist of

1. The typical collection of the Diptera of Osten Sacken.
2. The typical collection of the western Diptera of Osten Sacken.
3. The typical collection of the N. American Diptera of Prof. Loew, in Guben, Germany.

All three are labeled by Osten Sacken and Prof. Loew, and are still kept separated according to the wishes of Osten Sacken. They are all in the same condition as when received. After a careful investigation they are found to contain 2,136 species, named in the catalogue for *Orthoscapha* 1,317 species, *Cycloscaapha* 212 species, *Pupipara* 7 species. But it should be noted that about one-third of them, 648 species, are *unica*. Of the species starred in the catalogue only 33 are not in the collection. Of the *Cecidomyidæ*, which are not starred in the catalogue, 22 species are represented in the collections. Besides those enumerated a very large number of manuscript names of Loew and O. Sacken are attached to yet undescribed species, besides a very large number of undetermined or even assorted specimens.

The collections of Osten Sacken are presented to the Museum ; the collection of Prof. Loew has been bought.

DESCRIPTION OF A NEW FOSSORIAL WASP.

BY W. H. PATTON, WATERBURY, CONN.

CHLORION AERARIUM.

Length one inch. Bronzed-purple ; antennæ, mandibles, tegulæ and feet black, postscutellum blue ; wings dark brown, with a purple reflection. Clypeus terminated by a row of five teeth, the lateral teeth a little more remote from the intermediate teeth than the intermediate teeth are from the median tooth. Head and thorax smooth, with scattered and shallow punctures ; metathorax transversely striate throughout, the striæ on the

upper face finer. First recurrent nervure received by the second submarginal cell in the middle, second recurrent nervure received by the third submarginal cell near the base. Spiracles of the first segment of the abdomen situated upon tubercles.

One ♀ specimen. Plainville, Conn., Aug. 30, 1871.

NOTES ON THE HUMBLE BEES.

BY G. J. BOWLES, MONTREAL, P. Q.

(Read before the Montreal Branch of the Ent. Soc. of Ontario.)

Packard places the Hymenoptera at the head of the Class Insecta, on account of the completeness of their transformations and the perfection of their instincts. This is also the position assigned to this Order by Dana. Packard ranks the Bees (Apidae) at the head of the Hymenoptera, thus placing them at the very summit of the insect creation. Cresson, however, in his "Catalogue of the Described Species of N. A. Hymenoptera," has them a long way down the list, after the Ants, Wasps, etc. Who shall decide when such authorities disagree?

I wish to draw attention to the Humble Bees of this part of Canada, giving as far as I can the names of the species found here and some notes on their economy, the latter chiefly taken from Putnam's paper published in 1863.

The genus *Bombus*, says Swainson, appears to be a Northern and chiefly European and American genus; there are very few inter-tropical species, and very few Oriental. Some of the tropical species, however, are very large, much larger than those found in temperate climates. As regards North America, Cresson, in 1863, enumerated 46 species, of which the greater number are found in the northern part of the continent. I have carefully tabulated his list, and find that the arrangement of their habitats is as follows, beginning at the South: Mexico 6, Southern States 3, Middle 7, Western 5, Kansas and Utah 8, California 2, New England 8, Canada 7, Hudson Bay 5, Arctic 13, Sitka 3, Greenland 1, unknown

3, and one species from Antigua. The large number from Arctic America is surprising, and would lead one to think that the number given for the more southern parts is not correct. The Arctic species, however, are peculiar to that part of the continent, only three of them being found in Hudson Bay Territory, and only one of them coming as far south as Canada. Many of the other species are also local, but some are found over a wide area. Thus *virginicus* is found all over Canada and the United States east of the Rocky Mountains, *vagans* from Canada to the west, *fervidus*, *pennsylvanicus* and *separatus* the same, and *ternarius*, the only Arctic species found in Canada (according to Cresson), seems to extend also over the North-Eastern, Middle and far Western States. Britain possesses about 40 species.

The common name, Humble Bee, is said to be derived from Hummel or Hummer Bee, alluding to the noise made by the wings during flight. In Scotland the largest species found there is called the Bumbee.

In North America the Humble Bee is the nearest approach we have, as far as indigenous Bees are concerned, to the Hive Bee. The latter (*A. mellifica*), however, has become naturalized on this continent in the forests to a considerable degree beyond civilization, making its nests in hollow trees, or among the branches, sometimes under ledges or in clefts of the rocks. It is said not to have been found to the west of the Mississippi before 1797, but in 14 years it had advanced 600 miles further in that direction. I have never heard of the Honey Bee becoming wild in Canada, but it probably would if neglected when swarming takes place.

To return, however, to the Humble Bees. They do not form communities so large as Honey Bees, seldom more than two or three hundred occupying one nest, in some species not more than fifty or sixty. The community is dissolved on the approach of winter; the males and workers die, and only females have the power of passing the winter in a torpid state, among moss, in rotten wood, or in some other situation where they may enjoy protection from frost and concealment from enemies—to perpetuate the race by founding new communities in the ensuing spring. Workers are chiefly produced in the earlier part of the season, males and perfect females in the latter part of it. The females are much less prolific than those of Honey Bees, and seemingly as a kind of provision for this deprivation, they, unlike the Honey Bees, live in the same community without seeking to destroy one another, provided they belong to the same colony or nest.

Their nests are placed in different situations, some species having different habits from others in this respect. Thus of the English species, *B. terrestris* makes its nest in holes in the ground, at the depth of a foot or more, floored with leaves and lined with wax, and often entered by a winding passage. Others, as *B. lapidarius*, make their waxen nests among stones; others, as *B. muscorum*, among moss, which they mix and join with wax. The nests are enlarged as the community increases. In the spring the female or queen bee, having awaked from her torpid state, roams about until she finds a suitable place for a nest. On deciding, she immediately collects a small amount of pollen mixed with honey, and in this deposits from seven to fourteen eggs, gradually adding to the pollen mass until the first brood is hatched.

As regards the Bees which I have examined, some were taken at Quebec by me some years ago, and one or two species here. I have to thank Mr. Caulfield for the principal part of the material.

There are certain differences between the sexes which render it easy to distinguish them. Not to enter too scientifically upon this part of the subject, I give the principal points of difference.

The females may be known by their large size, and the corbiculæ or baskets on the posterior tibiæ, formed by a fringe of long hairs on *each side*.

The workers generally resemble the females very closely, the only observable difference being in the size, and this varies greatly. They may be found of all sizes from the female downwards, so that it is impossible to tell the difference in some cases.

The male is smaller than the female and larger than the generality of the workers. It has one joint more in the antennæ and one section more in the abdomen than the female.

Cresson says a very conspicuous character to distinguish the sexes is this: In the male the inner tooth of the tarsal claws is almost as long as the outer, in the female the inner tooth is quite short compared with the outer. The posterior tibiæ are without baskets, but have a fringe of hairs on the outer side.

APATHUS, Newm.

The following remarks on this genus are from Mr. Cresson's "List of the North American Species of *Bombus* and *Apathus*," Proc. Ent. Soc'y Phil., 1863:

This genus is parasitic on that of *Bombus*, and resembles it very much in general appearance. The characters with which to distinguish it from *Bombus* are as follows: The posterior tibiæ are destitute of corbiculæ (or baskets) and are convex exteriorly; the basal joint of the posterior tarsi has no tooth at its base above. In the *female* the apex of the abdomen curves under, and the apical segment beneath has the lateral margins elevated. The mandibles have a single notch, while those of *Bombus* are distinctly toothed. This genus has no workers.

The males may be distinguished from those of *Bombus* by the posterior tibiæ being exteriorly convex and thickly coated with short hairs. The males of the latter genus have the exterior surface of the posterior tibiæ concave in the centre, with a few scattered hairs, and are fringed at the exterior margins.

The economy of our species is almost unknown.

LIST OF BEES OF THE GENERA BOMBUS AND APATHUS TAKEN IN
THE PROVINCE OF QUEBEC.

BOMBUS, Latreille.

- Virginicus, Oliv. 1 male, 4 females, 1 worker; Quebec, Montreal.
 Separatus, Cresson. 1 male; Montreal.
 Vagans, Smith. 2 females, 1 worker; Quebec, Montreal.
 Perplexus, Cresson. 1 male; Montreal.
 Fervidus, Fab. 1 male, 3 females, 2 workers; Quebec, Montreal.
 Pensylvanicus, DeGeer. 1 female; Montreal, Quebec (Provancher).
 Terricola, Kirby. 2 females; Quebec, Montreal.
 Ternarius, Say. 1 male, 6 females, 2 workers; Quebec, Montreal.
 Flavifrons, Cresson. 1 male, 3 workers; Montreal.
 Sylvicola, Kirby. 3 workers; Montreal.

APATHUS, Newm.

- Ashtoni, Cresson. 1 male, 2 females; Quebec, Montreal.
 Elatus, Cresson. 3 females; Montreal.

THE HESSIAN FLY.

The following circular in reference to the Hessian Fly has been issued from the office of the U. S. Entomological Commission. The subject is a most important one, and fearing it might not otherwise reach all our readers, we present it here:

DEPARTMENT OF THE INTERIOR—OFFICE OF THE U. S. ENTOMOLOGICAL COMMISSION.

Providence, R. I., June, 1879.

DEAR SIR,—The Commission desires your co-operation in obtaining facts concerning the habits of the Hessian Fly, with statistics of losses occasioned in your town or county by its attacks; and accounts of the remedies best calculated to prevent its increase, and to destroy it. In brief, the habits of the Hessian Fly are as follows: In May and June two or three small, reddish-white maggots may be found embedded in the crown of the roots of the wheat, at or near the surface of the soil, causing the stalks and leaves to wither and die; the maggots harden, turn brown, then resembling a flax-seed, and change into little *black* midges with *smoky* wings, half the size of a mosquito, which appear in spring and autumn, and lay from twenty to thirty eggs in a crease in the leaf of the young plant. Specimens of the fly may be obtained by sweeping the wheat when three or four inches high, with a gauze net. Please send me specimens of the fly, eggs, maggot and “flax-seed,” in vials of alcohol, with notes as to the date when found, and full information as to the insect enemies and parasites.

The *Wheat Midge* is apt to be confounded with the Hessian Fly. It is a small, mosquito-like fly, *orange yellow*, with clear wings, which hovers over fields of young wheat in June. It attacks the heads of the wheat, laying its eggs when the wheat is in blossom. On hatching, the maggots crowd around the young kernels of wheat, causing them to become shrivelled. The maggots in July and August descend into the ground, spinning a round cocoon smaller than a mustard seed, remaining an inch below the surface till the following June.

Information regarding the following topics is respectfully solicited; to be forwarded at the close of the season:

1. When, where, and how are the eggs deposited?
2. When does the maggot appear?
3. When is the “flax-seed” state of the Hessian Fly, or the seed-like cocoons of the Wheat Midge assumed?
4. At what date do the Midges appear in spring and autumn?
5. Look for minute parasites in the eggs and maggots. They may be bred by placing the eggs and maggots with the wheat in bottles covered with gauze, and the parasitic flies preserved in vials of alcohol.

6. Give statistics as to abundance and losses in your town.

7. State the best preventive remedies, as deep ploughing or burning in the fall, or the rotation of crops.

Specimens of the wheat affected by these insects, and of the eggs, maggots and flies, together with their parasites, in alcohol, are requested. When mailed, the alcohol can be poured out, and cotton soaked in alcohol will keep the specimens wet until received. Packed in a tin box they can be sent through the mail. Address as below. Respectfully yours,

A. S. PACKARD, JR., Providence, R. I.

LIST OF BUTTERFLIES COLLECTED IN DAYTON, OHIO.

BY G. R. PILATE.

<i>Papilio</i> ajax.	<i>Euptoieta</i> claudia.
" " <i>var.</i> telamonides.	<i>Phyciodes</i> nycteis.
" " " Abbotii.	" tharos.
" " " marcellus.	<i>Grapta</i> interrogationis.
" philenor.	" " <i>var.</i> umbrosa.
" asterias.	" comma.
" troilus.	" " <i>var.</i> dryas.
" turnus.	<i>Vanessa</i> antiopa.
" " <i>var.</i> glaucus.	<i>Pyrameis</i> atalanta.
" cressphontes.	" huntera.
<i>Pieris</i> protodice.	" cardui.
" " <i>var.</i> vernalis.	<i>Junonia</i> lavinia.
" rapæ.	<i>Limenitis</i> ursula.
<i>Colias</i> eurytheme.	" disippus.
" philodice.	<i>Apatura</i> celtis.
" " <i>var.</i> alba.	" clyton.
<i>Terias</i> nicippe.	<i>Neonympha</i> eurytris.
" lisa.	" canthus.
<i>Danaïs</i> archippus.	<i>Debis</i> portlandia.
<i>Argynnis</i> cybele.	<i>Libythea</i> Bachmanni.
" myrina.	<i>Thecla</i> calanus.
" bellona.	<i>Chrysophanus</i> thoe.

Chrysophanus americana.	Pamphila cernes.
Lycæna pseudargiolus.	“ verna.
“ comyntas.	Amblyscirtes vialis.
Ancyloxypha numitor.	Thanaos brizo.
Pamphila zabulon.	“ juvenalis.
“ “ var. pochahontas.	Pholisora catullus.
“ huron.	Eudamus pylades.
“ otho var. egremet.	“ tityrus.
“ Peckius.	

CORRESPONDENCE.

Eburia quadrigeminata Say has been considered by me a rare beetle in this locality until within the last two years. I have taken it very abundantly in July and August while sugaring for moths in an old apple orchard in Kendall Co., Illinois.

Dorcaschema alternatum Say abounds in July and August on hedges of Osage Orange, and is found more abundantly on the shaded rather than on the sunny side of the hedge.

Deces spinosus Say is very abundant in July on what is usually known as rag-weed—*Ambrosia artemisiæfolia* Linn.

I have in cabinet eleven ♀ examples of *Rhyssa lunator* Fabr., and seven ♀ examples of *Rhyssa atrata* Fabr. One *lunator* presents some peculiarities that seem worth recording. Ten of the ♀ *lunator* have the supporters of the ovipositor uniformly a trifle shorter than the ovipositor itself, but the eleventh is to me somewhat of a monstrosity. What should be the ovipositor consists of three exceedingly fine hair-like projections, not more than three-fourths the length of the semi-cylindrical supporters. These hairs are of a yellowish color, the tip of each one, for about one-sixteenth of an inch, being black, the usual color of the ovipositor in *lunator*, or at least the color of the ovipositor in ten of my eleven examples. Will some hymenopterist please explain the matter?

O. S. WESTCOTT, Racine, Wis.

I have to record the capture of *Macroglossa tantalus*, June 2nd. It was taken on Mr. Erastus Coming's farm, at Kenwood, Albany Co., N. Y. In same locality I have also taken in former years *Deilephila tersa*, *Cherocampa versicolor*, *Sphinx cingulata*, *Plusia formosa*, *P. mortuorum*, *Abrostola ovalis*, etc.

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No. 8.

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The Canadian Entomologist.

VOL. XI. LONDON, ONT., AUGUST, 1879.

No. 8

NOTES UPON THE PREPARATORY STAGES OF CERTAIN SPECIES OF BUTTERFLIES. NO. 2.

BY W. H. EDWARDS, COALBURGH, W. VA.

4. *MELITEA MINUTA* Edw.—Figured in Mead's Report on Butterflies of Colorado. Syn. *Arachne* Edw.

CHRYSLIS.—Length .54 inch; cylindrical; head case short, narrow, rounded at vertices, the sides sloping; mesonotum rounded, not prominent, followed by a shallow depression; the abdomen large, and offering several rows of short conical tubercles; color yellow-white or buff, marked with black; top of head case black, the antennæ cases same; mesonotum with two crescent spots on each side; on the wing case a central patch and dark border; the segments of abdomen edged with black on dorsal side; a ventral longitudinal stripe and one on either side; the tubercles black at summit, orange at base.

Sent by Mr. Boll, and obtained from larva bred by him in the spring of 1879, in western Texas. This resembles in shape the chrysalis of *Baroni* and *Phaeton*.

5. *PARNASSIUS SMINTHEUS*, var. *BEHRII*.

EGG.—Does not differ from that of type *Smintheus*, as figured in Butterflies of N. America, vol. 1. Button-shaped, the sides rounded, the top depressed, base flattened; the surface covered with a crust of hexagons, which diminish as they approach the micropyle, and show a little opening at each corner of the hexagon down to the shell; color chalky-white. Deposited on leaves of species of *Sedum*.

YOUNG LARVA.—Length .9 inch; cylindrical, thickest anteriorly, tapering slightly to last segment; the segments well rounded; color black, with four rows of tubercles on either side, not very prominent, whitish, each sending out one or more black hairs; from those of dorsal

and first lateral row one hair each ; from the second lateral row four hairs each ; from the third or lower lateral row two hairs ; head sub-globose, the surface rough but scarcely granulated, and thinly covered with short black hairs ; color black.

6. PARNASSIUS BALDUR Edw. *Clarius* Boisd., not Eversmann.

EGG.—A little larger than *Smintheus*, of same shape, and covered in same way with a crust of hexagons ; color pale coffee-brown. Laid on species of *Sedum*.

YOUNG LARVA.—Not distinguishable in shape, markings or color from *Smintheus*.

Mr. Mead brought me, in September, 1878, a large number of the eggs of both these Parnassians, obtained by him from females shut up with *Sedum*, while he was in Nevada. I kept the eggs in a cool place until 29th December, and then brought a few of each species into a warm room. On 16th January three larvæ of *Smintheus* came forth, eating a round hole in the side of the egg. On 31st Jan'y one *Baldur* hatched. I had fresh leaves of the same *Sedum* on which the eggs had been laid, and there was an effort to gnaw the surface of these, but all the larvæ died in course of a few days. On 25th Feb'y I brought more of the eggs into my room, and the weather having turned warm at that time, the larvæ quickly came out. Most of them died very soon after, but a few eat of the leaves and grew to double their original size, when one after another died. It is possible that in nature the larvæ do not emerge until the plant is in bloom, and if I succeed in obtaining more eggs, I will retard them till *Sedum* in flower can be had. Very little is known of the larvæ of species of *Parnassius*.

7. CHIONOBAS IVALDA Mead. Fig'd in But. N. A., Part viii., Vol. 2.

EGG.—Sub-conic, broadest at base, nearly as broad as high, rounded at top ; marked by about 18 vertical ridges, the sides of which are irregularly excavated ; part of these terminate at about three-quarters the distance from base to summit, and the remainder gradually sink to the surface ; the spaces between the ridges over the top being irregularly and shallowly pitted.

YOUNG LARVA.—Length .11 inch ; stout anteriorly, tapering to last segment, which ends in two blunt conical tails, each with a terminal white bristle ; color at first soiled white, soon after greenish-white, striped longi

tudinally with dull red ; a broad medio-dorsal stripe, another on middle of side, running to tail ; a third along base of body ; between the dorsal and lateral stripes a brown line, and a second just below lateral ; on each segment from 3 to 12, on either side, are three rows of white clubbed hairs, springing from white tubercles ; head rounded, broadest below, broader than next segment ; the surface much covered with shallow punctures ; color dull yellow ; across upper front face is a curved row of four round brown tubercular spots, and six spots across middle face, each sending out a dark hair ; the ocelli dark.

This larva was received from Mr. Mead, in Nevada, and was but just out of the shell when I opened the box. Like the larvæ of the Parnasians, it came from a hole in the side of the egg. This was 18th August, 1878. The larva lived till 21st September, readily feeding on grass, and was about to pass its first moult when it was accidentally killed. It behaved like other Satyrid larvæ, being sluggish, and moving very little. Probably in nature hibernation occurs when the larva is half grown.

8. CHIONOBAS IDUNA Edw. Fig'd in But. N. A., Vol 2.

EGG.—Shaped like *Ivallda* ; the ridges sinuous, more prominent, sharper than in *Ivallda*, and the larger part extend from base to summit. Sent me by Mr. O. T. Baron.

TINEINA.

BY V. T. CHAMBERS, COVINGTON, KY.

It has so happened that within a few years past Professors Zeller and Frey in Europe, and I in the U. S., have at about the same time described a large number of American species of Tineina, and as might have been expected under these circumstances, it has occasionally happened that the same species has been twice described under different names. I am, however, surprised to find how seldom this has happened. In so far as I have been able, from the figures and descriptions of Professors Zeller and Frey, to identify their species with those described by me, I have heretofore done so in the pages of this and other journals ; and I have to thank

Dr. Hagen for the ability to make the following corrections and identifications, which I was unable to make from the published descriptions of Professors Zeller and Frey alone. Dr. Hagen has submitted to my examination some of the type specimens of those authors in the Collection of the Museum at Cambridge, and from them I am enabled to make the corrections noted below. There still remain a few of the species of Professors Zeller and Frey which I have not seen, but as types of more than three hundred of the species described by me are in the Museum, which I believe also contains types of the greater number of American species described by Frey and Zeller, the species may be readily determined by any one having access to the Collection.

Argyresthia quercicaella Cham.

From Colorado. Previously described by Zeller from Texas specimens as *A. abdominalis*.

Batrachedra Clemensella Cham.

From Kentucky and Colorado. Previously described from Texas by Zeller as *B. striolata*. In Bul. Geo. Survey, v. 3, pp. 134 and 141, I at first confounded it with *B. praeaugusta*; whilst the true *praeaugusta*, then first discovered in America, was described as a new species under the name *B. Clemensella*. Afterwards, when the supposed new species was discovered to be *praeaugusta*, the name *Clemensella* was transferred to the species which had been erroneously supposed to be *praeaugusta*, and which is the *striolata* of Zeller. I have not seen any authenticated specimens of *B. salicifomella* Clem., but I suspect it is at most only a variety of *praeaugusta*.

Lithocolletis Hageni Frey & Boll.

In my account of *L. necopinusella* I suggested that it might prove to be *L. Hageni* F. & B., and so it turns out on examination of a type specimen of the latter species.

Lithocolletis gemmea F. & B.

With a doubt indicated by a mark of interrogation, Messrs. F. & B. identify this species with *Parctopa robiniella* Clem. Misled by this identification, I, in the Cin. Quar. Jour. Sci., vi., p. 209, made some comments on its transference from *Parctopa* to *Lithocolletis* by Messrs. F. & B., and asserted what is unquestionably a fact, that *P. robiniella* Clem. is not a

Lithocolletis, but is a *Gracilaria*. A more careful comparison of *P. robiniella* with the description of *L. gemma* by F. & B., convinced me that the latter was a very different insect from *P. robiniella*, and that its identification therewith by F. & B. was altogether wrong; and it further convinced me of the fact that *Gracilaria mirabilis* F. & B. is *P. robiniella* Clem., which I had previously transferred to *Gracilaria* as *G. robiniella*. These corrections were made in the Cin. Quar. Jour. Sci., vi., p. 339. An examination of one of the types of *L. gemma* shows that it is a true *Lithocolletis*, nearer perhaps to *L. ornatella* Cham. than to any other known species, but very distinct from it, and about as much like *Gracilaria* (*Parectopa*) *robiniella* Clem. (*G. mirabilis* F. & B.) as *Colias philodice* is like *Papilio asterias*.

L. aenigmatella Frey & Boll.

I have not seen a specimen of this species, but I think it will turn out to be *L. tilliella* Cham., described long previously.

L. Scudderella Frey & Boll.

A specimen of this species is among the insects submitted to me by Dr. Hagen. I have heretofore regarded it as equivalent to the variable *L. salicifoliella* Clem. & Cham. Unfortunately I have no specimen of the latter species now with which to compare the specimen of *Scudderella*, but I incline to the opinion, after examining *Scudderella*, that it is distinct from *salicifoliella*.

L. quercivorella, n. sp.

Face, tuft and antennæ silvery white, the sides of the tuft immediately over the eyes reddish saffron, and each antennal joint with a fuscous spot on the upper side at its outer margin. Thorax and primaries reddish orange, with a wide white streak along the middle of the thorax from its anterior margin to the apex, which, when the wings are closed, is continuous with a dorso-basal streak on each fore wing, and which extends beyond the middle of the dorsal margin. There are on the fore wings three costal white streaks; the first is dark margined behind and on the *costa* before; the second behind and around the tip, with the dark scales produced a little way back; both of these streaks are oblique and resemble in position and character the costal streaks of *L. basistrigella*, *L. ulmella* and *L. bicolorella*. The third streak is a mere spot before the ciliæ, is dark margined both before and behind, and opposite to it is a dorsal white

streak pointing obliquely backwards, densely dark margined behind, its dark margin continued into the densely dusted apex. Ciliæ silvery grayish with a basal dark brown hinder marginal line. Hind wings pale silvery fuscous with silvery ciliæ. Abdomen pale yellow; tip silvery. Legs white; tarsi annulate with black. *Al. ex.* $\frac{1}{4}$ inch.

The form and size of the mine in leaves of *Q. obtusiloba*, and the general reddish saffron hue of the insect, ally it to *L. Bethuncella*, *L. unifasciella* and *L. castaneæcella*, one of which I believed it to be until I bred it. In other respects it is allied as closely to the *ulmella* group, as above stated.

Incurvaria mediotriatella Clem., Proc. Acad. Nat. Sci., Jan'y, 1860, p. 5.

Tinea auristrigella Cham., CAN. ENT., v. 5, p. 86.

I am satisfied that in *T. auristrigella* I have re-described Dr. Clemens' species, though I see no sufficient reason for separating it from *Tinea*. *T. iridella* Cham. will probably also be referred to *Incurvaria*.

INSECTS OF THE NORTHERN PARTS OF BRITISH AMERICA.

COMPILED BY REV. C. J. S. BETHUNE, M. A.

From Kirby's Fauna Boreali-Americana: Insecta.

(Continued from Vol. x., p. 217.)

[286.] VIII. LEPIDOPTERA.

FAMILY PAPILIONIDÆ.

[288.] 403. *PONTIA CASTA* Kirby.—Plate iii., fig. 1.—Three specimens taken in Lat. 65°.

[A well-known variety of *Pieris oleracea* Boisd.; quite common in Canada.]

[289.] FAMILY NYMPHALIDÆ.

404. *MELITÆA SELENIS* Kirby.—Taken in North America. [Is our common *M. tharos*.]

405. *ARGYNNIS CYBELE* Fabr.—Taken in Canada by Dr. Bigsby. [Common in Canada ; for description and figures, and for a full account of the differences that distinguish this species from *A. aphrodite*, No. 407, see Edwards' "Butterflies of N. America," Part i.]

[290.] 406. *ARGYNNIS MYRINA* Fabr.—Taken in Canada by Dr. Bigsby. [Quite common in Canada and well-known to collectors.]

407. *ARGYNNIS APHRODITE* Fabr.—Taken in Canada by Dr. Bigsby. [Quite common ; see our note on *A. cybele* above.]

[291.] 408. *ARGYNNIS FREYA* Esper.—Expansion of the wings $1\frac{1}{2}$ inches. Three specimens taken near Cumberland-house, Lat. 54° .

Stalk of the antennæ yellow with a large compressed dark-brown knob, red underneath at the base and tip ; wings tawny, dark-brown at the base, with a narrow black band occupying the posterior margin, followed by a series of black arrow-headed spots ; next to which in the primaries is a zigzag angular discoidal black band, and at the anterior margin five transverse spots of the same colour ; the underside of these wings is tawny variegated with black and white spots and lines ; the secondaries are underneath reddish-brown variegated with white and yellow spots and bands, with a discoidal arrow-headed white spot in the centre ; the fringe of the wings is alternately white and yellow.

[A decidedly northern insect ; has been taken in Labrador.]

[292.] FAMILY VANESSIDÆ.

409. *VANESSA C-ARGENTEUM* Kirby.—Plate iii., figs. 6 and 7. Expansion of the wings 2 inches. A single specimen taken in Lat. 54° .

Antennæ brown above, pale below ; knob pale at the tip ; wings angular, cut out into sinuses which are dentated ; primaries above orange-tawny, with five black round spots forming a right-angled triangle with each other ; two triangular costal bars and posterior margin black ; above the black marginal band is a series of paler tawny triangular spots ; underneath the wings are veined, marbled and clouded with black, brown, and cinereous ; the primaries have a very broad paler band near the margin ;

secondaries above dull-orange, at the base with a black spot or two near the anterior margin; the other half is black with a transverse series of triangular pale spots, the interior ones being nearly obsolete; the disk is inscribed with a slender silver somewhat obtusangular C, with the concavity towards the anterior margin.

[Synonymous with our common *Grapta prognæ* Cramer.].

410. *VANESSA FURCILLATA* Say.—Taken in Canada by Dr. Bigsby. Common in the N. West Territory and the vicinity of Fort William.

[Synonymous with *V. Milberti* Godt., a common and very familiar butterfly throughout Canada. For description and figure see Say's Am. Entomology, vol. ii., pl. 27.]

[293.] 411. *VANESSA ANTIOPA* Linn.—Taken in Canada by Capt. Sheppard. [Too common in Canada to require any description.]

[294.] 412. *VANESSA ATALANTA* Linn.—Several taken in Canada. [Quite common; for description see Harris' Insects of Mass., p. 294.]

[295.] 413. *CYNTHIA CARDUI*.—Linn.—[Another very common butterfly; see Harris' Insects of Mass., p. 291.]

[296.] 414. *CYNTHIA HUNTERA* Drury.—[Almost as common as the preceding species; see Harris' Insects, p. 292. This and the two preceding species are now included in the genus *Pyrameis* Hubn.]

[297.] FAMILY HIPPARCHIADÆ.

415. *HIPPARCHIA NEPHELE* Kirby.—Expansion of the wings $2\frac{1}{2}$ inches. Taken in Canada by Dr. Bigsby.

Antennæ brown annulated with white, rufous at the end; knob slender; wings brown; primaries both above and below with a paler submarginal broad band including two eyelets; the upper ones surrounded by a paler atmosphere, with a black iris and white pupil; on the under side the atmosphere of the eyelets is more distinct and forms a kind of glory round them; the pupil is snowy-white with some blue scales scattered round it; the under side of both wings, above the band, is marbled with transverse deeper coloured streaks; the secondaries are dentated but not the primaries, which at the margin have two transverse black parallel

lines ; in the former there is anteriorly a costal paler bar, and the posterior half of the wing is paler ; between the bar and the marginal paler band are three minute eyelets, with a black iris and bluish pupil, arranged transversely in a triangle ; and three more similar ones arranged obliquely, the external one minute, in the paler part, the internal one pointing to the anal angle.

[Quite common in Canada ; included in the genus *Satyrus* Westwood.]

[298.] 416. *HIPPARCHIA DISCOIDALIS* Kirby.—Plate iii., figs. 2, 3.—Expansion of the wings $1\frac{3}{4}$ –2 inches. Several specimens taken at Cumberland-house, Lat. 54° .

Body brown. Antennæ annulated with white ; wings very entire, brown ; costa spotted with gray ; a triangular obscure reddish-tawny discoidal stripe extends from the base to the posterior margin of the primaries, and is discoverable also on the under side where the wing is faintly clouded with gray at the tip ; the secondaries underneath are indistinctly marbled and clouded with gray or whitish scales ; fringe whitish and brown alternately.

[A northern species ; has been taken at Fort Simpson, and in Alaska.]

FAMILY LYCENIDÆ.

417. *THECLA AUGUSTUS* Kirby.—Plate iii., figs. 4, 5.—Expansion of the wings 1 inch. Taken in Lat. 54° .

Antennæ annulated with white ; knob elongated ; wings dusky black with a dull ferruginous disk ; fringe alternately black and white ; secondaries underneath black at the base ; at the apex dusky ash-coloured, with a transverse series of about eight black spots, rudiments of which appear on the same surface of the primaries.

Named after the Esquimaux Augustus.

[Taken in Canada, the New England States, and New York.]

[299.] 418. *LYCÆNA DORCAS* Kirby.—Plate iv., fig. 1.—Expansion of the wings 1 inch. Taken in Lat. 54° .

Body black above, white underneath. Antennæ black, annulated with white ; knob tipped with orange ; wings brown with a reddish tint, underneath tawny ; primaries with an angular band formed of faint black spots ; behind these nearer the costa is a black bar, above which are two more

spots ; between the band and the posterior margin are three more black spots arranged transversely, and above the base are three spots forming a triangle ; the secondaries have a slight sinus near the anal angle, the fringe of which projects so as to assume the appearance of a shorttail ; a cross the disk runs an angular band ~~formed~~ of faint black spots, above which is a crescent of the same colour ; at the ~~anal angle~~ is an orange coloured angular bar, or abbreviated band ; underneath, these wings have several indistinct black dots, the three external ones of which form an obtuse angle with the four internal ones.

This species seems the American representative of *L. Phleas*, but its colour is much less vivid.

[Belongs to the genus *Chrysophanus* Hubn. ; it is probably identical with *C. Americana* D'Urban.]

419. *POLYOMMATUS LUCIA Kirby*.—Plate iii., figs. 8, 9.—Expansion of the wings 1 inch. One specimen taken with the preceding.

[300.] Wings above silvery-blue, terminating, especially at the posterior margin, in a very slender black line ; fringe white barred with black ; primaries underneath ash-coloured mottled with white ; in the disk is a black crescent and a curved macular band, consisting of, mostly, oblique black crescents edged with white, especially on their under side ; the wing terminates posteriorly in a broadish, brown band, formed chiefly by obsolete eyelets ; the secondaries are brown ; underneath spotted and striped with black and white ; towards the posterior margin the white spots are arranged in a transverse band parallel with it ; and, as in the primaries, the wing terminates in several obsolete eyelets.

[Figured by Harris (Ins. Mass., figs. 105, 106) under the name of *P. pseudargiolus*. Not uncommon in Canada and the Northern States.]

FAMILY HESPERIADÆ.

420. *HESPERIA PECKIUS Kirby*.—Plate iv., figs. 2, 3.—Expansion of wings 1 inch and $\frac{1}{2}$ a line. Taken with the preceding, and also by Prof. Peck.

Body brown, paler on the under side. Antennæ rufous above, below the joints have a patch of white scales ; knob fusiform, hooked ; wings above tawny-brown, with an articulate angular band, common to both wings, of pale yellow ; primaries striped and streaked with the same colour

near the base, and in the costal area ; underneath the wings are paler ; the primaries have nearly the same marks as above but more conspicuous ; on the secondaries the angular band is surmounted by another irregular spot, so as to form two contiguous spots, or rather one large irregular didymous one.

[Quite common in Canada.]

[301.] FAMILY ZYGÆNIDÆ.

421. *ALYPPIA MAC CULLOCHII* Kirby.—Plate iv., fig. 5.—Expansion of wings $1\frac{1}{8}$ inch. Taken in Nova Scotia by Dr. Mac Culloch, and in Canada by Dr. Bigsby.

Body and wings very black. Orbit of the eyes externally clothed with white hairs ; base-covers or tippets whitish ; primary wings with three very white spots, one near the base oblique, obversely wedge-shaped, divided into two by a longitudinal black line ; next, at a little distance from the anterior margin, is a subtrapezoidal, small, white spot, between which and the posterior margin is an articulate band, abbreviated at each end, of the same colour, consisting of six spots divided by black lines ; the same spots distinguish the under surface of these wings, and besides there is a whitish longitudinal one in the costal area ; in the secondaries are also three white spots on both surfaces, viz., a large rectangular one near the base divided longitudinally into four ; a longitudinal undivided one at the anterior margin ; and an articulate posterior abbreviated band, divided into five spots ; the longitudinal costal streak may almost be regarded as forming a sixth, as the lower end is parallel with the last spot of the band ; the four anterior legs are externally covered with long orange coloured hairs, which character is also found in *A. octomaculata*.

FAMILY SPHINGIDÆ.

422. *SMERINTHUS CERISYI* Kirby.—Plate iv., fig. 4.—Expansion of the wings $2\frac{3}{4}$ inches. Taken in North America, locality not stated.

[302.] Body ash-coloured ; thorax with a large trapezoidal brown spot dilated next the abdomen ; primaries angulated, ash-coloured, with a transverse series of brown submarginal crescents in a paler band, between which and the posterior margin is another obsolete paler one ; above the crescents is a straight whitish band, and a linear angular forked one under the internal sinuses of which the wings are clouded with dark brown ;

underneath the above markings of the wing are very indistinct ; the secondaries are rose-colour, paler at the costal and posterior margins ; underneath they are dusky-cinereous, with a whitish band coinciding with that of the primaries, a transverse series of crescents and a dentated brownish band, all rather indistinct ; but the most conspicuous character of the secondaries is a large eyelet situated at the anal angle, consisting of a black pupil, nearly but not quite surrounded by a blue iris, and situated in a black triangular spot or atmosphere, which extends to the anal angle, and is surmounted by some blue scales ; the abdomen above is dusky ash-coloured.

This insect appears to be the American representative of *S. ocellatus*, from which, however, it differs considerably. It comes very near to *S. geminatus* (Say *Am. Ent. i., t. xii.,*) but in that the eyelet has two blue pupils.

423. *DEILEPHILA INTERMEDIA* Kirby.—Expansion of wings $2\frac{1}{2}$ inches. Taken in North America.

This species is intermediate between *D. Euphorbiae* and *D. Galii*, which last it most resembles, but the anterior portion of the mesal stripe of the primary wings is pale rose-colour ; the fringe of their inner margin, and of the posterior of the secondaries is white ; there is no series of white dots on the back of the abdomen and the ventral segments are fringed at the apex with white hairs. This description was taken from an old specimen apparently somewhat faded.

[Is probably identical with *D. Chamenerii* Harris, a common species in Canada.]

[303.] FAMILY SESIADÆ.

424. *SEsia RUFICAUDIS* Kirby (*Sphinx pelasgus* Cramer).—Expansion of the wings $2\frac{1}{8}$ inches. Taken in Canada by Dr. Bigsby, and in New Jersey by Mr. Drake.

Body yellow-olive, underneath pale-yellow. Antennæ black ; primaries reddish-brown, hyaline in the disk, with the hyaline part half divided towards the base with a costal bar, covered with yellow-olive hairs at the base ; underneath the costa, the posterior margin and the nervures are dark ferruginous ; there is also a yellow stripe on the inner side of the base ; secondaries hyaline in the disk ; base externally and costa yellow ; internally the base is ferruginous ; underneath the dark part of the wing

is ferruginous, and the base pale-yellow ; two first segments of the abdomen yellow-olive, two next black, the rest ferruginous with pale-yellow lateral spots.

This species appears to be the American representative of *Sesia fuciformis*, which it greatly resembles, but differs in the colour of the tail and the base of the secondaries.

[This description is not sufficiently definite for the determination of the species.]

FAMILY LITHOSIADÆ.

425. *CALLIMORPHA PARTHENICE* Kirby.—Expansion of the wings $1\frac{3}{4}$ inch. Taken in North America.

[304.] ♂. Antennæ black, bipectinated ; thorax flesh-coloured with two anterior, and three posterior, oblong, black spots, the latter being the largest ; primary wings black, with the so-called rivulets pale with a slight pinkish tint ; the main streams, especially towards the apex of the wing, form several islets, most of which are divided by slenderer ones which do not appear on the under side of the wing ; the secondaries are of the colour of red lead, with five black spots towards the posterior margin, the intermediate three forming a macular band, above which is one smaller one and below it another ; underneath there is also a small spot, at the costal margin, above the others.

[A species of *Arctia*, probably identical with *A. virgo* Linn. ; not uncommon in Canada.]

426. *CALLIMORPHA VIRGUNCULA* Kirby.—Plate iv., fig. 6.—Expansion of the wings $1\frac{1}{2}$ inch. Taken in Canada by Dr. Bigsby.

Head pallid ; orbit of the eyes, and the mouth, black ; antennæ black, serrato-pectinate ; thorax pallid, with five lanceolate black spots, the posterior ones being the largest ; primary wings black, with pallid rivulets, which are formed by the scales that clothe the nervures, and produce the rays at the apex of these wings, where the lines are traversed by a transverse, angulated band ; underneath they are pale, with the black parts less distinct, except at the apex ; there is a black spot in the disk near the costal margin ; the secondaries are orange-tawny, spotted at the apex with black ; abdomen tawny above, below pale, with a dorsal, and on each side a double, lateral, black, macular stripe ; trunk underneath black, with pale

hairs intermixed ; legs black ; tibiæ pale above ; thighs with a pale spot at the base and apex.

This is nearly related to the preceding species, but is much smaller ; and the painting and spotting of the wings differ materially.

[A species of *Arctia* ; taken in Canada.]

[305.] 427. *LITHOSIA MINIATA Kirby*.—Expansion of the wings 1½ inch. Taken in Canada by Dr. Bigsby.

Head, trunk, base and apex of the abdomen, costal and anal margin, mesal forked stripe of the primary wings, and base of the secondary, miniatous or of the colour of red lead ; two longitudinal stripes and the space between the apical fork of the primaries, apex of the secondaries, and middle of the abdomen, slate-coloured.

[Belongs to the genus *Hypoprepia* Hübn. ; not uncommon in Canada.]

FAMILY CTENUCHIDÆ.

428. *CTENUCHA LATREILLANA Kirby*.—Expansion of wings 2⅛ inches. Taken in Canada by Dr. Bigsby, and in Nova Scotia by Dr. Mac Culloch.

[306.] Body, and primary wings, light-brown. Antennæ and anal hairs black ; head and base of the primaries, bright orange ; trunk, back of the abdomen, and outside of the thighs, cyaneous or blue-green ; fringes of the wings white, but in the middle of the posterior margin brown ; secondaries short.

[Previously described under the specific name of *virginica* Charp. ; quite common in Canada.]

Mr. W. F. Kirby has been transferred from the Natural History Museum, Royal Dublin Society, to the British Museum. His new address is 5 Union Road, Tufnell Park, London N., England.

TORTRICIDÆ.

BY PROF. C. H. FERNALD, STATE COLLEGE, ORONO, ME.

Tortrix (Loxotaenia) Clemensiana, n. s.

Head and thorax above ochre yellow; palpi darker on the outside, lighter beneath; antennæ dark ochre yellow, minutely pubescent in the male; legs straw yellow, in some specimens the fore and middle legs are fuscous in front; thorax beneath and abdomen above and beneath silvery fuscous, in some specimens very light straw color; anal tuft light straw color.

Fore wings straw yellow, some specimens inclining to ochre yellow. Most of the examples before me show the venation on the upper side of the fore wings in darker lines; costal fold short and near the base of wing; beneath fuscous in the males, very light straw yellow in the females; fringes light straw yellow above and beneath.

Hind wings very light straw yellow above and below, or nearly white, darker towards the apex and fuscous in some specimens towards the anal angle; fringes above and beneath nearly white.

Expanse—♂ 20-23 m. m.; ♀ 19-21 m. m.

Habitat—Maine, Mass., N. Y., Wis. Described from twenty males and seventeen females.

This species is in the collection of Dr. Clemens, now in the collection of the Am. Ent. Soc., under the name of *Tortrix pallidana*, but no description was published, and since the name *pallidana* is pre-occupied, I have named it for Dr. Clemens.

This species has a strong superficial resemblance to *Tortrix lata* Robs. and *Tortrix pallorana* Robs., but may be at once distinguished by the costal fold on the fore wings of the male, which does not occur in *lata* or *pallorana*.

Tortrix (Lophoderus) juglandana, n. s.

Head, thorax and fore wings reddish brown to dark brown. Fore wings each with two oblique narrow bands of darker brown than the ground color of the wing; the first, beginning at about the basal third of the costa, extends obliquely across to the middle of the inner border; the second begins near the middle of the costa and extends obliquely across the wing parallel to the first band, and ends at the anal angle; these

bands expand somewhat on the costal and inner borders. On the fore wings of most of the males are scattered scales of a straw yellow color, especially bordering the oblique bands; fringes of the fore wings lighter in the middle, but at the apex and anal angle concolorous with the oblique bands.

Hind wings above, with their fringes, as well as the abdomen above and the under side of fore wings, fuscous. Under side of hind wings and legs lighter.

Expanse—♂ 15–20 m. m.; ♀ 20–26 m. m.

Habitat—Mass., N. Y., Ontario, Ohio, Wis.

Described from eleven males and fifteen females.

Raised by James Angus, of West Farms, N. Y., on Hickory leaves.

Penthina osmundana, n. s.

Front of the head and first two joints of the palpi, light ochre yellow; last joint of the palpi, two spots on the outside of the middle joint of the palpi, vertex, thoracic tuft and an edging of scales around the patagia, dark purple; front of thorax dark reddish brown with violet reflections in certain lights.

Fore wings dark reddish brown with a large reddish yellow subtriangular spot, the base resting upon and occupying the middle half of the hinder border of the wing, while the opposite angle extends nearly to the costa. The basal patch has numerous lead-blue metallic scales scattered over it, showing a slight indication of an arrangement in cross lines in some specimens, the outer edge beginning at the basal third of the costa, extends directly across the wing as far as the middle of the cell, thence in a more or less waved line across to the hind margin near the humeral angle. This line is frequently indicated by whitish scales. From the middle of the costa an interrupted double row of lead-blue metallic scales extends obliquely across the wing towards the outer margin, confluent on the disk, curving downward beyond and ending near the anal angle. Numerous similarly colored scales rest upon the outside of the yellow spot, and in a line curving up and outward join the previously described line, leaving the ocellus quite free. On the costa beyond are three light colored geminate spots faintly seen, from the inner one of which a lead-blue line extends obliquely outward, and curving down, ends near the middle of the outer margin. More or less black scales rest upon the borders of these lines. Fringes fuscous, purple in one specimen.

Hind wings and abdomen above, together with all the wings beneath, fuscous, with violet reflections. Body, abdomen beneath, together with the legs, lighter. Fore legs in front light brown with lighter rings at the ends of the joints.

Expanse 12 m. m.

Described from five males and one female.

Found feeding on *Osmunda regalis* in Orono, Me., by Mr. A. Allen, drawing the leaves together with its silken threads. Emerged July 1, 1879.

Grapholitha albinaculana, n. s.

Head, antennæ, thorax, abdomen above and fore wings, ashy grey, the scales of the fore wings tipped with whitish. A white triangular spot rests upon the middle of the hind margin of the fore wing and extends upwards to the fold, edged with black on the side next the thorax. Four small geminate white spots rest upon the costa; the first at the basal third, from which a metallic band of dull leaden hue extends across the wing to the white spot on the hind margin; the next two costal spots beyond are somewhat nearer each other than to the others; from the first of these a metallic band extends across the wing, terminating near the anal angle; the fourth spot is near the apex and sends a metallic stripe to the outer margin just below the apex; beneath this is a short metallic stripe extending downward and forming the outside of the ocellus, which last contains two parallel black dashes. The space between the first and second bands is more or less filled with black from the costa downward. Fringes metallic with a black line at the base.

Hind wings above and below white at the base, sprinkled with dark scales, blackish on costa and outwardly, fringes lighter. Underside of fore wings fuscous, showing traces of the markings above. Underside of body and abdomen silvery white. Palpi and all the tarsi greyish, the latter tipped with whitish.

Expanse of wings 13 m. m.

Described from two males taken in Orono, Me.

Retinia? Comstockiana, n. s.

Head in front, basal joints of antennæ and palpi white; last joint of

palpi and a few scales upon the outside of the middle joint dark grey. Eyes black, vertex light sulphur-yellow to straw-yellow, antennæ dark brown annulated with whitish. Thorax above white with a few scattered grey scales; beneath silvery white. Abdomen above light brown with a silvery lustre, lighter at the end of each segment; beneath lighter; last segment in the females darker brown above and beneath, and without the silvery lustre. Anal tuft in the males light straw-color. Fore and middle legs light brown, femora and tibia of hind legs white, tarsi of all the legs brown ringed with white. Fore wings ferruginous brown, the extreme costal edge from base to near the apex dark brown. A number of small white spots rest upon the costa, four pairs beyond the middle, from all of which stripes composed of white and leaden-hued scales extend more or less irregularly across the wing at nearly right angles with the costa, and having something of a wavy appearance in some specimens, with some indication of a basal patch, a central and subterminal bands composed of the leaden and white scales. Fringes light brown above and beneath; fore wings light brown beneath, ferruginous apically, with the white spots of the costa well indicated. Hind wings above and beneath greyish brown with a tinge of ferruginous in some specimens, and with darker irrorations on the costa and outwardly; fringes long at the anal angle, somewhat lighter and with a darker line near the base.

Expanse—♂, 18-20 m. m.; ♀, 18-20 m. m.

Habitat—Ithaca, N. Y.

Described from two males and three females received from Prof. J. Henry Comstock, who "found the larvæ boring in branches of *Pinus rigida* at Ithaca," and to whom I dedicate this species.

I have provisionally referred this species to the genus *Retinia*, for, although it agrees with the definition of the genus as given by Heinemann in other respects, the venation of the fore wing differs in the origin of veins four and five, which are not from the same point, but a little remote from each other; the distance between veins five and six at their origin is about twice the distance between veins four and five.

The Annual Meeting of the Entomological Society of Ontario will be held in the rooms of the Natural History Society, in Ottawa, on Tuesday, the 23rd of September, at 4 p.m.

INJURIOUS AND BENEFICIAL INSECTS FOUND ON THE
ORANGE TREES OF FLORIDA.

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

Since my discovery of the mite found preying upon the eggs of the Orange Scale Insect (*Aspidiotus Gloverii*), I have been studying the insects found on the Orange tree, and my study has resulted in bringing to light many curious insects, of which I submit the following brief description. Those interested will find a full account of their habits in the *Florida Agriculturist*.

Glover's White or Yellow Orange Mite.

Acarus? Gloverii, n. sp.—Soft, flattened, oval, of a pale yellow color, with a broad pinkish flesh-colored stripe extending from thorax down the middle of abdomen, terminating at hinder edge, which is obtuse; legs eight, thin, finely pubescent, with two claws. Length about .01 of an inch. In company with them are often seen pale flesh-colored specimens, which are the immatured ones.

I find it mentioned by Townend Glover in an old Agricultural Report published in 1855. It seems pretty widely distributed through Florida and is found in company with the Oval Scale Insect (*Aspidiotus citricola*) on the eggs of which it probably feeds.

Aphelinus of the Orange Scale.

Aphelinus aspidioticola, n. sp.—Head and thorax light reddish brown; head nearly same width as thorax, three ocelli, eyes prominent, dark; antennæ three-jointed (?), the last joint is club-shaped; a dark brown spot on thorax at base of each wing; wings hyaline, both fore and hind wings ciliated from end of costal vein; no other apparent veins; a small dark reddish spot on fore wings at termination of costal vein; abdomen rather elongated, and of a darker shade of brown than the thorax, with two oblong spots of very dark brown on each side; legs rufo-testaceous, with a tibial hair at junction with tarsi. There is also a short ovipositor, hardly

perceptible. I have found numbers of the scales of *Aspidiotus citricola* with a hole perforated in the top by the *Aphelinus*, into which it crawls and lays its eggs; the larvæ on hatching feed upon the eggs of the Scale Insect. Glover also mentions having found it.

Leaf-Scaled Coccus.

Lecanium phyllococcus, n. sp.—Oval, convex, cinereous (entirely coated with a powder-like substance). Antennæ eight-jointed, inserted below and under the eyes; abdomen composed of eight or more segments; surrounding the outer edge is a series of leaf like scales extending to the head; legs six. Length from .03 to .14 of an inch. Some are very large and nearly round, which I believe are the females ready to lay their eggs. The eggs are laid under a cotton-like substance and are elliptical, of a pale yellow color; about .02 of an inch in length. It is found in the new shoots and terminal branches.

My attention has been drawn to a strange insect by Rev. T. W. Moore, which he supposes is the cause of the Orange rust. It may be termed the Oil-eating Mite of the Orange, belonging to the genus *Typhlodromus*, and is probably the first species of this genus discovered in America.

Typhlodromus oiliioorus, n. sp.—Whitish, flesh color, elongate, cylindrical, gradually increasing in size until near the head it becomes twice as thick as at tail; abdomen apparently consisting of numerous very thin segments; at the extremity is a bifid appendage that evidently assists in clinging to the Orange; just above it protrude two caudal filaments; head almost entirely hidden in thorax; beak short and black; legs four, rather stout, with one claw and two tarsal hairs. It is too small to measure with my instrument, so must wait until I can get a micrometer to ascertain its length.

They attach themselves to the oil cells; as the oil exudes the chemical action of the atmosphere causes it to oxidize, and the result is a hard rusty skin. They all fall off and disappear half an hour after the fruit has been picked; hence the reason why microscopists could never detect any insect, and as a *dernier* resort, attributed the rust to a fungoid. Thus the long-vexed question of what causes the Orange rust is solved, and proves to be not a fungoid, as many suppose, but an infinitesimal creature that could never have been discovered except with the aid of a microscope.

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The Canadian Entomologist.

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PARASITES OF THE COTTON WORM.

BY PROF. C. V. RILEY, WASHINGTON, U. S.

Among the parasites so far found to attack and destroy *Aletia argillacea* Hübn., aside from two not reared to the perfect state, are the following: Obtained from the egg, *Trichogramma pretiosa* n. sp.; from the larva, *Tachina aletiae* n. sp., and *Sarcophaga sarraценiæ* Riley; from the pupa, *Pimpla conquisitor* (Say), *Cryptus nuncius* Say, *Chalcis ovata* Say, and *Cirrospilus esurus*, n. sp.

I append descriptions of the new species, in order that they may be properly referred to by Prof. J. H. Comstock, who is now finishing the report on the Cotton Worm begun by me while connected with the Département of Agriculture.

1. *TRICHOGRAMMA PRETIOSA*, n. sp.—Length about 0.3 mm. Yellow, the eyes red, the wings hyaline. Head wider than the thorax; antennæ 5-jointed, joints 3 and 4 in the ♀ forming an ovate mass and together shorter than joint 2; joint 5 large, thickened and very obliquely truncate; in the ♂ joints 3, 4 and 5 form a more or less distinct, elongate club, beset with long bristles. Hairs of the wings arranged in about fifteen lines. Abdomen not so wide as the thorax, but as long as the head and thorax together; in the ♀ the sides subparallel, and the apical joint suddenly narrowed to a point. Described from numerous specimens reared from eggs of *Aletia argillacea*.

Differs from *Trichogramma minuta* Riley (Third Rep. Ins. Mo., p. 158, fig. 72, ♀) in its smaller size and uniform pale yellow color, and also in the form of the third and fourth joints of the antennæ. As defined and figured by Westwood, the antennæ of *Trichogramma* are 6-jointed. Walker, in his "Notes on the Chalcidæ," pt. vi., p. 105, employing

Forster's characters, says the antennæ are 8-jointed ; but an examination of the figure of the type (*Trichogramma evanescens*, l. c., p. 114) shows that one of the joints counted is the "annulus" above the scape, which I do not consider to be a true joint, and that what I have indicated as the apical joint, in agreement with Westwood, is represented in that figure as three coalesced joints. I have proposed the generic name of *Pentarthrum* for *minuta* in MS. now in Mr. Scudder's hands, but until the allied genera are better characterized than at present, it is best to use the old genus *Trichogramma*.

2. *CIRROSPILUS ESURIUS*, n. sp.—Length 1.5 mm. Dull black; knees, tibiæ and tarsi yellowish, the posterior tibiæ sometimes dusky. Eyes with scattered, short bristles. Antennæ of the ♂ 9-jointed, with the joints of the flagellum subequal and beset with bristles, the ninth joint small. Antennæ of the ♀ 8-jointed, the fourth and fifth shorter than the second and third, the three apical joints forming a club. Thorax above microscopically punctate; parapsides distinct and elevated; scutellum with a longitudinal, impressed line on each side. Wings hyaline, pubescent, but the cilia short; base of ulna uneven; radius not developed. Abdomen short and sessile, ovate. Described from numerous specimens reared from the pupa of *Aletia argillacea*.

This species shows relationship with the genus *Tetrastichus* Halliday, and may ultimately be referred there. For the present I prefer to place it in the older genus.

3. *TACHINA ALETIÆ*, n. sp.—Length 8 mm. Black; head golden, facial depression silvery, space between the eyes and the frontal stripe about equal to the breadth of the stripe, bristles of the head black, the pubescence behind and beneath the eyes white; antennæ blackish, palpi testaceous. Eyes at a moderate distance apart, thinly pubescent; front moderately prominent; third joint of the antennæ three or four times the length of the second joint. Thorax and the second and following abdominal joints more or less ashy, the thorax with four or five longitudinal black stripes. Wings subhyaline. Legs black, with a piceous tinge; tarsal cushions yellowish. Scutellum and the sides of the first, second and third abdominal joints sometimes tinged with reddish-brown. No strong bristles on the first and second abdominal joints above.

Described from two specimens, reared in November, 1878, from the pupa of *Aletia argillacea*.

MEETING OF THE ENTOMOLOGICAL CLUB OF THE
AMERICAN ASSOCIATION FOR THE ADVANCE-
MENT OF SCIENCE.

The annual meeting was held, as announced, on the 26th day of August, in the Town Hall, in Saratoga, N. Y. The first session began at 12 : 30 p. m., the President, J. A. Lintner, of Albany, in the chair. The following members were present during the several sessions : Dr. John L. LeConte, S. H. Scudder, C. V. Riley, A. R. Grote, C. H. Fernald, Dr. John G. Morris, Rev. C. J. S. Bethune, Wm. Saunders, J. H. Comstock, E. P. Austin, F. W. Putnam, B. P. Mann, H. F. Bassett, W. S. Barnard, D. S. Martin, E. L. Graef, Dr. J. S. Bailey, and E. H. Pohlman.

The Secretary, Mr. B. P. Mann, read the minutes of the last meeting in St. Louis, Mo., after which the President delivered the following address :

ANNUAL ADDRESS OF THE PRESIDENT.

GENTLEMEN :—

In the remarks which I presented to the Club at our last annual meeting a brief review was given of the progress in American Entomology within the preceding half century. It was shown that within the last few years rapid progress had been made ; that the study of insects had enlisted the labors of many earnest and successful workers, and given to them names honored in science both at home and abroad ; that many large and valuable collections had been accumulated—several of which contained so large a number of types that their preservation in the future was a matter demanding serious consideration ; that the literature had become quite extensive ; that much had been done in working out the life-histories of our species and presenting them to the public in their economic relations ; and finally, that the importance of the study had at last been recognized here, as long ago it had been in Europe, by a Commission appointed by our General Government for the investigation of some of the insect pests which were the occasion of serious pecuniary loss, poverty, and almost starvation in some portions of our country.

It affords me pleasure to be able to report, that the past year has shown no diminution of interest or activity in our department, but that work in it is being prosecuted with an energy and with results fully up to any other department of Natural Science, if we except those to which Congress and several of our States are extending their liberal aid.

If fewer new species have been described during the year, we may find encouragement in the explanation that we are approaching the period, if not already reached, when a new species may not be claimed as the reward of every entomological excursion. And indeed, there does not seem to be urgent need of descriptions of forms so very far in advance of some degree of knowledge of transformations, habits and relations to the vegetable world.

An evidence of increasing interest is to be found in the frequent inquiries made for instructions in collecting, apparatus for preparation, and books for study. While the first two requests can be promptly met, not so with the last. We are unable to place in the hands of the student the volumes which he requires for naming his collections. This cannot but be the occasion of discouragement to the beginner, and often the cause of diversion of earnest labor to other departments of natural history. A great need of our science at the present is, monographs of the families prepared by specialists, in which descriptions of all the species shall be given (not simply referred to), and accompanied by such synoptical tables and illustrations as will enable the student readily to ascertain the names of any species which has been described.

At our last meeting I stated to you that the names of 281 persons are recorded in the last edition of the Naturalists' Directory who are making Entomology their study in North America, and that it was probable that a full list would extend the number to at least 350. It now appears that half the truth was not told. A list kept by the Secretary of the Cambridge Entomological Club, published in *Psyche*, vol. ii., p. 9 of Advertiser, accompanying the numbers for Sept.-Dec., 1878, contained at the close of last year the names of 762 Entomologists in the United States and Dominion of Canada. I am informed by the Secretary that the list at the present time, without having been subjected to a critical revision, contains 835 names.

As a record of the current literature of any science is virtually a record of the progress of that science, may I ask your attention to a brief notice of some of the publications of the year following our St. Louis meeting.

A work that might serve as a model in the illustration of insects in their relations to the plants upon which they feed or frequent, is one of the unique series by Mr. Glover of *Manuscript Notes from My Journal*, entitled, "Cotton, and the principal Insects frequenting or injuring the

plant." In its twenty-two quarto plates, engraved on copper, is shown the cotton plant in every stage of development from the seed to the mature plant, and in its various conditions as resulting from insect attack or from disease. In association with these figures, twenty-four insects frequenting the plant are represented. Several of the species are illustrated in an agreeable prodigality, giving enlarged views of the egg, the larva at different stages of growth, the pupa, the cocoon, the perfect insect at rest and in flight, its under surface, enlargements of parts, and the more marked varieties of the larva and the imago. Although not so stated, it is believed that the edition of these Notes was no larger than the others of the series, and consequently, that only about fifty societies and individuals have been the fortunate recipients of a copy.

The Natural History of the Agricultural Ant of Texas is a volume of 208 pages and 24 plates, by H. C. McCook, treating at length of the habits, structure and architecture of this interesting insect. The histological details have been worked out from preparations made by Prof. J. G. Hunt.

A volume, upon which Baron Osten Sacken has been for a long time engaged, has recently been completed and published by the Smithsonian Institution. The *Catalogue of the Diptera of North America* prepared by this author and published in 1858 was simply a compilation of published names, not claiming synonymic accuracy. It contained 1,800 species, but many of the number were too imperfectly described for identification. The new Catalogue is of such merit as to deserve more than a passing mention. It is fully up to, and in itself materially advances, our knowledge of the Diptera of our country. Its author modestly regards it as only critical in part—so far as the families have been worked out into monographs, and as still remaining a mere list of reference to earlier writers, in those families which have not been studied, or in which the existing collections are to a great extent still unnamed, as in the *Culicidæ*, *Chironomidæ*, *Cenopidæ*, the group of *Muscidæ calyptera*, and the section *Asilina*. Its critical character may be seen from the statement, that of the 102 species of *Tabanus* enumerated in the old Catalogue, only 36 have been adopted in this.

An admirable feature of this Catalogue is that a large proportion of the species which it records—over 2,000 carefully described and authoritatively labelled species—are contained in the Collections of the Museum of Comparative Zoology at Cambridge, where every possible care is given to

them, and where they are accessible to the student for comparison and study. Most of these are types of Loew and Osten Sacken, or their determinations.

The remarks of the author on synonymy, nomenclature and priority, seem to me to be most excellent and worthy of serious consideration. In an extended discussion of the merits of the descriptions of Diptera of the late Mr. Walker of the British Museum, he characterizes them as so extremely superficial—descriptive rather of the specimen than of the species, that in his opinion, they should be entitled to no claim for priority whenever they cannot be positively identified without an examination of the type specimen. Thus, of twenty-six species of *Dolichopus* described by him, not a single one could be recognized. The question suggests itself, to what extent might this rule be extended to descriptions in the other orders of insects by this author, and in general, to the writings of other authors.

In considering the number of Diptera, Osten Sacken believes, that rejecting those descriptions which will probably prove irre recognizable, the number of described Diptera of North America, north of Mexico, will hardly reach 2,500; that the undescribed material at present in collections, if worked up, would perhaps double the number; and that when the long neglected order shall have received the attention given to the Coleoptera, it will equal if not exceed the latter, numerically.

Reference at the present to studies in the Diptera, naturally suggests the great loss which Dipterology has sustained in the recent death—in April last—of the distinguished Prussian Dipterist, Dr. H. Loew, long known as one of the most eminent cultivators of this branch of Entomology. During the last twenty years he has been engaged in the study of North American Diptera, and at the request of the Smithsonian Institution he has prepared a series of monographs, three volumes of which (Parts i., ii. and iv.) have been published by that Institution. While his removal from his work at this stage of its progress, cannot but be deeply deplored, there is a consolation to be found in the knowledge that it is not to be wholly arrested, but that a worthy collaborator—Baron Osten Sacken—remains to conduct it to a completion, we hope, of the plan proposed.

The series of *Dimmock's Special Bibliographies*, now being published at Cambridge, Mass., will prove to be of eminent service to the student who desires to avail himself of the literature of our insects, so widely

scattered through the various scientific and popular journals, government surveys, and other publications. Two numbers of the series have been issued—the first containing a complete list to date, it is believed, of the Entomological writings of Dr. John L. LeConte, and the second, those of Dr. George H. Horn. A third, of the writings of Mr. S. H. Scudder, is nearly completed. I regret that it has been thought necessary, in this series, to dispense wholly with the use of capitals in all scientific names, even in the family and ordinal divisions, and I believe that many of you will agree with me in claiming for the royalty of science exemption from conformity to an innovation based on mere convenience.

Prof. C. V. Riley and J. Monell have contributed to the Bulletin of the U. S. Geolog.-Geograph. Survey (vol. v., pp. 1-32) a paper entitled *Notes of the Aphididae of the United States, with Descriptions of Species Occurring West of the Mississippi*. Part I contains extended biological notes on the Pemphiginae, by Prof. Riley, and Part II, notes on Aphidinae with descriptions of new species, by Mr. Monell. The paper, illustrated by two plates, is a valuable contribution to our knowledge of these exceedingly interesting insects.

A special Report from the Department of Agriculture, entitled, *The Silkworm, being a brief Manual of Instruction for the Production of Silk*, has been prepared by Prof. Riley, and largely distributed by the Department, to meet the demand from various portions of the United States for information upon the important industry of silk-culture. The Manual is quite full in the natural history of the Silkworm, in the methods of culture, and directions for reeling the cocoons. There seems no reason why this industry, properly fostered, may not be made to add materially to the productive resources of our country.

Abstracts of the papers presented by Prof. Riley at the St. Louis meeting of the American Association for the Advancement of Science, have been published in the Proceedings of the Society, and also in a separate pamphlet. Among these are *Notes on the Life-history of the Blister-beetles and on the Structure and Development of Hormia: On the Larval Characteristics of Corydalis and Chauliodes*, and *A New Source of Wealth to the United States [Sericulture]*.

A Century of Orthoptera, commenced by Mr. S. H. Scudder in 1868, and continued at intervals in vols. 12-20 of Proc. Bost. Soc. Nat. Hist., has been completed during the present year by the publication of the last three decades, in vol. 20, op. cit. The species described pertain to the

Gryllides, Locustariæ, Acridii and Forficulariæ. The several parts as originally published have been reprinted in a pamphlet of 84 pages. Mr. Scudder has also published (*Psyche*, vol. ii., p. 154) a short list of Orthoptera collected in Appalachicola.

Entomological Notes, No. vi., by Mr. Scudder, issued the past year, is mainly a reprint of papers upon the Orthoptera originally published in the preceding year. The accompanying index furnishes a ready means of reference to the species contained in the several papers.

In the Annual Report of the Chief of Engineers for 1878, Prof. Cyrus Thomas reports upon a small collection of Orthoptera made in the Explorations and Surveys of the San Juan region of Colorado. The same volume contains a report by Mr. H. Strecker, on the Hymenoptera, Lepidoptera and Coleoptera from the same region, in which several new species of Heterocera are described, and a few figured.

Of our Entomological serials, the CANADIAN ENTOMOLOGIST continues to sustain its high reputation, and to merit the contributory aid which it is receiving from nearly all of our American Entomologists, and from some of our European friends.

Psyche, the organ of the Cambridge Entomological Club, is near the completion of its second volume. With the commencement of its third volume such improvements are promised as will render it of still higher importance to every student of American Entomological literature.

The *Transactions of the American Entomological Society* have reached the seventh volume. Although the Society has become a section of the Academy of Natural Sciences of Philadelphia, it is proposed to continue the publication of the Transactions as at present as rapidly as the limited means available for the purpose will permit.

The *Bulletin of the Brooklyn Entomological Society* is continued. That of the Long Island Society has been discontinued.

The second volume of the *Butterflies of North America*, by Mr. W. H. Edwards, is in course of publication. It continues to maintain the high reputation which it has commanded, from its admirable delineations of forms and coloring, and the exceedingly interesting new biological details presented.

The North American Entomologist is a new candidate for favor and support, of which two numbers have appeared. It is a monthly periodical, published at Buffalo, N. Y., under the editorial charge of A. R. Grote.

It purposes to present articles of value both to the specialist and the agriculturist on the subject of North American insects, together with notices of current entomological literature.

Descriptions of the Noctuidæ have been continued by Prof. A. R. Grote in contributions to the CANADIAN ENTOMOLOGIST and in the *North American Entomologist*. With a diminution in the number of new forms of Noctuæ presenting themselves, Mr. Grote has directed his attention to the Pyralidæ, and has published a paper in the Bull. U. S. Geolog.-Geograph. Survey (vol. iv., pp. 669-705), entitled, *A Preliminary Study of the North American Pyralidæ*, in which a number of new species are described, the species of Botis enumerated, and the venation given of certain genera of the Phycidæ. A supplement to this paper follows in the *North American Entomologist*, No. 2, pp. 9-12.

To the study of the Tortricidæ—a family which has received scarcely any attention in this country since the death of Mr. C. T. Robinson, Prof. C. H. Fernald, of Orono, Me., has been devoting special and earnest attention. He has been able to examine nearly all the material contained in the principal collections in this country, and during the past winter has visited the larger collections in Europe for their study and a comparison with our forms. In England, the Tortricidæ in the following collections were critically examined by him: those of the British Museum, of H. T. Stainton, R. McLachlan, C. J. Barrett and Lord Walsingham; and on the continent, the collections in Brussels, Berlin, Munich, Naples, of Prof. Zeller in Stettin, Dr. O. Staudinger, MM. Deyrolle and Ragenot and the Jardin des Plantes in Paris. The above amount of preliminary work should certainly enable Prof. Fernald, as is his hope, to present us with a rearrangement of this extensive family quite in advance of any heretofore proposed. Prof. Fernald has prepared a synonymical list of our North American species, which is nearly ready for publication.

The work of Mr. V. T. Chambers on the Tineidæ of the United States, has been vigorously prosecuted, as may be seen in his frequent publications in the CANADIAN ENTOMOLOGIST. His papers on *Tineina and their Food-plants*, and *Index to the Described Tineina of the United States and Canada* (Bull. U. S. Geolog.-Geograph. Surv., vol. iv., pp. 107-167), have been appreciatively received as very convenient for reference.

The comparatively small but difficult group of the Pterophoridæ has engaged the attention of Mr. Charles Fish, of Oldtown, Me., and his studies have already made him our best authority in these forms.

From the above references to special studies in several of the families of the Lepidoptera, it will be seen that this attractive Order gives every promise of soon occupying high vantage ground.

In the other Orders—it is quite unnecessary that I should refer in the Coleoptera to the labors of Drs. LeConte and Horn. You all know of their untiring work, which has made the field which they are so thoroughly working almost exclusively their own.

In the Diptera, Mr. C. P. Whitney has published descriptions of a few species of Tabanidæ.

Mr. W. H. Patton has communicated some descriptive papers on Hymenoptera to the CANADIAN ENTOMOLOGIST.

Mr. E. T. Cresson has published a catalogue of North American Apidæ, with descriptions of new species, comprising 108 pages of vol. vii. of the Trans. Amer. Entomolog. Soc.

Some valuable lists of species collected in particular regions have been given us, which are of service in extending our knowledge of Geographical Distribution. Among these, in the Coleoptera, may be mentioned, a list by E. A. Schwarz of 1,457 Florida species (Proc. Amer. Philosoph. Soc., v. 17, pp. 353-472); of 1,246 species from the Lake Superior region by H. G. Hubbard and E. A. Schwarz; by the same, of 1,787 species from the lower peninsula of Michigan (loc. cit., v. 17, pp. 593-666); by Dr. LeConte, of 220 species collected in the Rocky Mountains at an elevation of 6,000 feet and upwards (Bull. Geolog.-Geograph. Surv. Terr., v. 4, pp. 447-480); additions to Messrs. Austin and LeConte's Catalogue of the Coleoptera of Mt. Washington, of 89 species, extending the number to 319, by F. Gardiner, jr. (Psyche, v. 2, p. 211); 316 species from Wallace Co., Kansas, by F. H. Snow (Trans. Kans. Acad. Sci., vol. vi., pp. 61-70); and additions of 435 species to the Catalogue of Kansas Coleoptera, by E. A. Popenoe (ut. cit., pp. 77-86), increasing the number to 1,711.

In the Lepidoptera, Mr. C. E. Worthington furnishes a list of 229 species of Noctuidæ from the vicinity of Chicago, Ill. (Canad. Entomol., v. xi., p. 68); Mr. W. L. Devereaux, a shorter list of species taken in Wayne Co., N. Y. (ut. cit., p. 105); Prof. F. H. Snow, a list of 104 species collected in Colorado, by the Kansas University Scientific Expedition in 1876.

The valuable biological studies of Mr. W. H. Edwards have been

continued with their wonted earnestness. Through the success attained by him in carrying a large number of species of butterflies from the egg through their transformations, he has secured their entire life-histories, several of which have been published during the past year, and others illustrated in the volume of the *Butterflies of North America*. Of the Satyridæ, the larvæ of which are so rarely met with that I may venture to say many members of this Club have not seen a living example, he has reared all of our Eastern species with the two exceptions of *Satyrus Pegale* and *Chionobas semidea*. The interesting experiments in producing change in the imago by the application of cold to the chrysalis have been continued and been duly recorded.

A large number of biological papers have been contributed to our Entomological journals. From those accessible to me at the time of writing I find contributions from the following: C. J. S. Bethune, J. Boll, Robert Bunker, V. T. Chambers, A. J. Cook, Charles Dury, H. Edwards, W. H. Edwards, J. H. Emerton, G. H. French, H. A. Hagen, E. C. Howe, D. S. Kellicott, J. L. LeConte, B. P. Mann, T. L. Mead, C. V. Riley, W. Saunders, C. G. Siewers, Emma A. Smith, F. H. Snow, C. E. Webster, O. S. Westcott, C. E. Worthington, and G. D. Zimmerman—a quite incomplete list of the contributors to this department.

Results of anatomical studies of insects have been published by Messrs. C. F. Gissler, J. D. Hyatt, E. L. Mark, and C. V. Riley.

It would be inexcusable in a notice of biological work to omit reference to what is being done in this direction at the Museum of Comparative Zoology at Cambridge. Under the hand of the eminent Curator of the Entomological Department, Dr. H. A. Hagen, a biological collection of insects has been brought together that is far in advance of any similar collection in the world. It was my privilege recently to give it a partial examination, and when I say that I know not how to express my high estimation of it, I give it but imperfect praise. No one, whose studies have prepared him for the appreciation of such a collection, can examine it without wondering when, where and how the material was obtained. As an illustration of the natural history of species, in their several stages, architecture, depredations, food-plants, diseases, parasites, etc., it is difficult to see how its plan of arrangement can be improved. In consideration of its high value, it is very gratifying to see that such unusual means have been resorted to for its preservation, as, with a reasonable supervision and without the operation of other than the ordinary causes of destruction,

will extend its benefits to our successors in coming centuries. In addition to the biological collection, two others have been arranged: the one comprising the insects of North America, and the other those of the world. Of the number of type specimens contained in these collections, there is not the time at present, nor is it the occasion, for more than simple mention. The student in American Entomology, who aims to be fully abreast of the most advanced progress in his line of study, cannot neglect the means of information which the Collections and Library of the Entomological Department at the Cambridge Museum offer him.

The published results of economic investigations during the year have been quite limited. In consideration of the exceeding importance of these studies, it is painful to have to record the fact of the issue of but one Annual Report of a State Entomologist—that of Cyrus Thomas. This second report of Dr. Thomas, forming the seventh in the series of the Illinois reports, is a volume of nearly 300 pages. In it Dr. Thomas discusses the depredations of some of the Orthoptera, Coleoptera and Hemiptera. Prof. G. H. French, Assistant Entomologist, presents brief descriptions of a large number of diurnal and nocturnal Lepidoptera and their larvæ, with notices of their habits, accompanied by analytical tables for their identification. Miss Emma A. Smith, special Assistant Entomologist, offers the results of original investigations in some species of special economic importance. The publication of this and the preceding Report, without, as is evident, the opportunity of the revision and correction of proof by the authors, is much to be regretted, as serious errors in the nomenclature and elsewhere have thereby been given extensive circulation.

The Annual Report of the Entomological Society of Ontario, making the ninth in the series, contains its usual amount of matter of interest to the entomologist, and of value to the agriculturist and horticulturist.

Several articles treating of insect depredations have appeared in our scientific journals, which cannot now be referred to.

The United States Entomological Commission, continued by an appropriation by the last Congress of \$10,000, is actively engaged in its second year's operations. In its investigations of the Rocky Mountain Locust, its labors have been almost entirely confined to that portion of country designated as the Permanent region, with a view of determining the limits of these permanent breeding grounds, and to obtain the requisite data for the preparation of a map, and a scheme to be recommended to the Gov-

ernment, by which the excessive multiplication of the species in that region, and the consequent migration therefrom, may be prevented. It is understood that the recommendation to the Government will be, that in connection with the authorities in British America, efforts be made to restrain the extensive prairie fires in autumn which are common to that region, and subsequently to burn them in the spring after the hatching of the young locusts. This plan is believed to be feasible, as the breeding grounds are not co-extensive with the so-called Permanent region, but are limited to the richer valleys, plateaus and river borders within it.

The Commission will also, it is understood, in its forthcoming Report, recommend to the Government a scheme for a system of warning and prevention, through the aid of the mounted police patrol of the Dominion Government, and our Signal Bureau and military posts.

Having been favored with a transcript of the subjects to be treated of in the forthcoming 2nd Report of the Commission, and the assignment of subjects to the respective members of the Commission, I have no hesitancy in giving assurance of a volume of unusual interest and value. It is to be hoped that Congress will not repeat the inexcusable blunder of ordering of it an edition by far too small to supply the demand, or for the accomplishment of a main object in its laborious preparation—the diffusion of the needed information among those to whom it could not fail of proving beneficial.

The Commission is also occupied with investigation of the Hessian-fly and the Chinch-bug—each of which are chargeable with annual injuries to the amount of several millions of dollars.

The investigation of the natural history and habits of the Cotton-worm, commenced by the Department of Agriculture last year, has by direction of Congress, been transferred to the Entomological Commission. Prof. Riley has been pursuing its study in Southern Texas and in the Gulf States, aided by special assistants, and it is believed that discoveries have recently been made which will reduce the cost of destroying the larvæ to perhaps a fourth of what it has hitherto been.

Among the special subjects of study which have claimed attention lately, an interesting one has been the pupation of butterflies. Observations made during the past year on the pupation of some of our butterflies have shown us that we have been at fault in accepting the account given of it by Reaumur over a century ago, and received and quoted by

subsequent authors. The most interesting operation in the pupation of the suspensi butterflies is the withdrawal of the chrysalis from the larval skin, the casting off of the skin with its attachment by the terminal legs to a button of silk spun for the purpose by the larva, and the attachment and suspension of the chrysalis by its anal spine to the silk button. Reaumur represented it as accomplished by the chrysalis in its extensions and contractions grasping the larval skin between the segments, and by this means raising itself until it regained the button. Recently Mr. Osborne, an English Entomologist, discovered a membrane serving as a suspensory agent in the change to the pupal state, and for the first, questioned the account given by Reaumur. His observations were confirmed by those of Mr. W. H. Edwards, and followed up by additional observations on large numbers of Nymphalidæ and Danaidæ, some of which have been presented in the CANADIAN ENTOMOLOGIST. There seems to be no question of the existence of such a membrane, and that it consists of the portion of the larval skin lining the region of the rectum, caught upon two knobs conveniently placed for the purpose. Prof. Riley, in a communication to *Psyche* (vol. ii., p. 249) finds other means of chrysalis suspension—the principal one being the shed intestinal canal, and accessory ones, the tracheal vessels of the last pair of spiracles; these Prof. Riley regards as the principal agents in suspension. In opposition to this, Mr. Edwards considers these ligaments as of but little, if any, service, and finds the membrane to furnish all the requisite support. Additional observations are required to reconcile these different views.

The beds of fossil insects recently discovered in the Tertiaries of our western Territories are proving to be wonderfully rich in number of species and condition of preservation. From a single small basin exposed by a railway cut in the vicinity of Green River Station, Union Pacific Railroad, in Wyoming, Mr. S. H. Scudder in *Fossil Insects of the Green River Shales* (Bull. U. S. Geolog.-Geograph. Surv. Terr., iv., No. 4, pp. 747-776) enumerates eighty species, representing all the orders of the Insecta except Lepidoptera. An idea of the richness of these beds may be obtained from the statement, that a two hours' search was rewarded by the collection of fifty new species. We are glad to learn that Mr. Scudder is engaged upon a general work on our fossil insects, which will form one of the volumes of the quarto reports of the Hayden Survey—the beautiful typography and illustration of which causes us to regret the prospective speedy termination of the series. As the Tertiary Shales of the Rocky

Mountain region give every promise of being richer in insect remains than any other country in the world, the material for this volume will be more ample than any other student in fossil entomology has been able to command.

For the evident omission of reference to much valuable work done during the period reviewed, I ask indulgence. The time that I had allotted to the preparation of my sketch was found, too late, to be quite insufficient for the extended bibliographical examinations required for even an approach to completeness. I offer it only as a partial sketch, and as such please accept it.

On motion, the thanks of the Club were tendered to the President for his able and interesting address, with the request that a copy be sent to the CANADIAN ENTOMOLOGIST for publication.

The Club next proceeded to consider the amendment to the Constitution proposed at the St. Louis meeting, and after much discussion, the amendment was adopted in the following form :

1st—No resolution affecting important scientific questions shall be adopted at any meeting of the Club unless there shall be present at least seven members who shall have been enrolled at least one year previous to said meeting.

2nd—When any motion has been carried by the Club, such motion shall not be rescinded at any subsequent meeting unless there shall be present at least seven persons who shall have been enrolled as members one year or more previous to said meeting.

3rd—Five members shall constitute a quorum for the transaction of ordinary business.

The Secretary was instructed to draw up a list of members of the Club, to be embodied in the record of its proceedings, including all those who had been present at previous meetings.

The second meeting was held at 4 : 30 p. m., the President in the chair.

Mr. Grote exhibited specimens of *Pseudohasis eglanderina* sent him by Mr. Jas. Behrens, of San Francisco, who had collected them on the top of Mount Shasta. These differed from the ordinary specimens in being almost entirely black on the upper side. Mr. Grote expressed the opinion that this variation was mainly due to the climatic influences to which they were subjected in this elevated situation.

Dr. J. G. Morris referred to the fact that certain Water Beetles carry with them when they dive a globule of air underneath their bodies, and asked for information as to what purpose it served. Mr. E. P. Austin said that this bubble was retained underneath by the stiff hairs along the abdomen, and as it was known that the air gradually disappeared if the insect remained long under water, it was supposed that the air was gradually inhaled by the insect, which was thus enabled to lengthen its stay under the water.

Mr. B. P. Mann presented a list of the Entomologists of North America, and requested the members to confer with him as to additions and corrections. Some beautiful examples of colored drawings of Noctuae by Mr. Pohlman, of Buffalo, were laid upon the table for the inspection of those present, and were much admired.

Mr. Scudder called the attention of the members to a lepidopterous insect which was doing much damage to the Pines on the Island of Nantucket. Previous to the war of 1812 the island was well wooded, but during that struggle the occupants were reduced to such straits for fuel that they had burned every tree. For many years the island had remained in a barren state, but some time ago plantations of Pines were begun, and a broad belt of young trees of *Pinus rigida* from 10 to 20 feet high, with scrub Oaks, now cover a large part of the island. The success of this experiment is seriously threatened by the presence of the insect referred to, which is a Tortrix belonging to the genus *Retinia*, and closely allied to *duplana*, *sylvestrana* and *frustrana* of Europe. The larva affects the tip of each terminal bud and bores its way through this into the twig to the depth of two or three inches, killing the terminal leaves and thus preventing the trees from making any growth. The moth is double brooded and has not been observed in that locality beyond the precincts of the island. Mr. Scudder also presented a plate with enlarged drawings of the insect and its work.

Mr. Comstock had met with the same insect on *P. inops*, and had found that the tips of the branches of the Pines were usually covered with a web. He had also found another species of *Retinia* infesting the twigs of *P. rigida*. This latter bores into the small twigs of the tree, from which there exudes masses of resin. The larva lives within the branch upon the wood, and before pupating forces its way through the mass to the outside.

Mr. Bassett had observed some fifteen years ago about Waterbury,

Conn., that the common White Pine (*Pinus strobus*) was greatly injured at the tips of the branches by *Pissodes Strobi*, but for the last ten years this pest had almost disappeared. Mr. Riley referred to another Tortrix affecting the Junipers on Long Island, *Dapsilia rutilana*, a European species recently imported.

DESCRIPTION OF PREPARATORY STAGES OF ARGYNNIS EGLEIS, Bois.

BY W. H. EDWARDS, COALBURGH, W. VA.

A. EGLEIS (♀ *Mormonia* Bois.) syn. *Montivaga* Edw., not of Behr.

I received from Mr. Mead, 18th Aug., 1878, Nevada, several eggs and newly hatched larvæ of this species. The eggs had been obtained by confining a female on Violet, and the female was also sent that I might identify the species. The larvæ became lethargic immediately after leaving the egg, as is the case with all our larger Argynnids whose history is known (at least in the late summer brood). I kept them in a cool room till last of January, when the survivors, three in number, were brought into my study, and left in glass with Violet leaves. By Feb'y 5th they were observed to be feeding. On 18th one passed first moult; on 5th March passed second moult; 16th March, third moult. This larva was shortly after killed by accident. The next one passed third moult 15th April, and the third passed same moult 17th April. I could see no reason why the first larva so far outstripped the other two in growth, as they were treated alike. No. 3 died before next moult. No. 2 passed fourth 26th April; fifth 7th May; 20th May suspended, and made chrysalis 21st May, but died before imago. I was able to get drawings of the last stage of the larva and of the chrysalis, as well as of the egg, which I hope some day to publish. The general history therefore follows that of the large Argynnids, and is considerably unlike that of the *Myrina* group. *Egleis* is a species midway in size between *Myrina* and *Cybele*.

EGG - Conoidal, truncated and depressed at top, rounded at bottom, the height to breadth nearly as 4 to 3, marked by about 18 vertical ridges, one half of which proceed from base to summit, the others about two-thirds the distance, then unite with the long ones; at the summit the

ridges form a serrated rim ; between the ribs are transverse striæ. This egg closely resembles that of *Myrina*, being higher and narrower than in *Cybele* and its allies.

YOUNG LARVA—Length .6 inch ; cylindrical, of even size, the segments well rounded ; color greenish-white ; on segment 2 is a dorsal collar, brown, with bristles ; after 2 on each segment is a cross row of dark brown sub-ovate spots, from each of which spring one or two hairs ; these hairs are long, straight, tapering, and with a rounded knob on end ; head obovate, bilobed, dark brown, shining, a little pilose.

After 1st Moul—Length .1 inch ; cylindrical, tapering posteriorly from 5 or 6 to end, the segments well rounded ; armed with six rows of black spines, which are stout at base, rising from black tubercles, taper irregularly, and throw out many divergent black hairs ; color grayish, mottled and specked with black ; head obovate, bilobed, the vertices rounded ; black, with black hairs.

After 2nd Moul—Length .16 inch ; same shape ; the spines shining black, and all from black tubercles except those of the lower lateral row, which have dull orange tubercles ; on 2 are two large dorsal spines, and on either side two tubercles with hairs ; color dark gray, mottled with black ; on either side of medio-dorsal line a gray stripe, and a pale band along base, over feet ; three days after the moul the gray sub-dorsal lines became broader and coalesced, making a dorsal band, and the space between the dorsal and first lateral spines also became decidedly gray ; head as at previous stage.

After 3rd Moul—Length .22 inch ; spines as before, except that lower laterals are yellow nearly to top ; all bristles black ; the two spines on 2 same length as other dorsals and somewhat porrected ; color blackish, with dark gray band along dorsum ; the sides between dorsals and first laterals finely mottled with gray.

After 4th Moul—Length .4 inch ; the spines long, stout at base, lower laterals yellow to tips, and rise from yellow tubercles ; the intermediate spines on 2 and 3 yellow also, those of 2 porrected ; color black-brown mottled with gray-white ; along dorsum two gray lines ; head sub-cordate, not much cleft, the vertices rounded, front flattened ; color dull black, the back of head dull yellow ; face much covered with black hairs.

After 5th Moul—Length .6 inch, and grew to 1.2 inch at maturity.

MATURE LARVA—Cylindrical, stout, the middle segments swollen ; color dark brown mottled with black, especially on the anterior part of each

segment, and somewhat with gray ; along dorsum a double stripe partly confluent and pale yellow, making in effect a distinct band ; the dorsal spines dull white, tips black ; both lower rows pale yellow, tips black ; the bristles short, divergent, and pale ; the spines on 2 a little turned forward, but not longer than others ; feet and legs pale brown ; head sub-cordate, black in front, dull yellow behind, with many short hairs.

CHRYSLIS—Length .8 inch ; cylindrical, the wing cases much elevated, the outer edges at base flaring ; head case square, transversely rounded ; mesonotum prominent, compressed, carinated, followed by an angular excavation ; the tubercles on abdomen very small, scarcely visible ; color dark brown, mottled in shades, and with more or less golden-brown ; the wing cases of one shade, dark, glossy.

NOTES ON NOCTUIDÆ.

BY A. R. GROTE, BUFFALO, N. Y.

Hadena passer.

Mamestra passer Guen., Noct. 1, 195.

Luceria loculata Morr., B. B. S. N. S., 2, 114.

I have received from M. Achille Gueneé an outline drawing of his *Mamestra passer*, and with the help of his description am enabled to make the above identification. The black marks tying the reniform to the t. p. line are variable, sometimes wanting ; the color varies from pale reddish brown to dark brown ; the claviform is thick and usually solid, but sometimes open ; the lines are usually effaced, but sometimes quite noticeable ; the ornamentation is exceedingly simple. The eyes are naked, so that, with several other species referred by Gueneé to *Mamestra*, as I have previously shown, this form should be placed in *Hadena*.

Marasmalus ventilator Grote.

This species must be added to the Texan fauna ; Mr. Belfrage sends me a specimen under the number 723, taken May 5.

Anticarsia gemmatilis Hübn.

Collected in large numbers and great variety by Mr. Westcott, Racine, Wis. Also by Mr. Belfrage in Texas (Nos. 724 to 729). It is sometimes quite gray with concolorous reniform ; again the reniform is whitish ;

sometimes of a tawny brown with concolorous or yellowish reniform ; sometimes of a yellowish brown with blackish powdery shades. The transverse posterior line is occasionally wanting, as are the extra-mesial geminate, black and fulvous spots on secondaries. Hardly two specimens are quite alike, but there is no room for suspecting more than one species.

CORRESPONDENCE.

A correspondent calls our attention to an

ENTOMOLOGICAL JOKE.

Packard's Guide to the Study of Insects, p. 302, says of the Noctuelitæ : " There is a great uniformity in the genera of this family, which are characterized by their thick bodies, the thorax being often crested, by the stout and well-developed palpi, and the simple and sometimes slightly pectinated antennæ."

The author of a tabular view and key of the more common families of Insects, after stating in his preface that his material has been selected for the most part from Packard's Guide to the Study of Insects and other authors, makes the following astonishing statement as one of the distinguishing characteristics of the Noctuelitæ : "*Thorax often crested by the stout and well-developed palpi.*"

How does Dr. Packard like this emendation? What effect would this have on Mr. Strecker if he should happen to see it just before dinner? Would not the next issue from Reading give us numerous variations on *ne sutor ultra crepidam*?

THE NORTH AMERICAN ENTOMOLOGIST.—Under this title a new Entomological serial has lately been placed before the public, edited by one of our esteemed contributors, A. R. Grote, of Buffalo, N. Y. It is an eight-paged monthly, nicely printed and illustrated by occasional plates. A portion of each number is occupied by scientific papers on Entomological subjects, followed by articles having an economic bearing under the heading of "Fruit and Farm," while the succeeding pages are occupied by very useful "Book Notices." The first three numbers which are before us contain some valuable scientific papers, as well as useful information to agriculturists and fruit-growers. We welcome this new candidate for public favor, and wish it every success. It is published by Reinecke, Zesch & Baltz, of Buffalo, N. Y., at two dollars per annum.

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The Canadian Entomologist.

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No. 10

ANNUAL ADDRESS OF THE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

To the Members of the Entomological Society of Ontario :

GENTLEMEN,—Again it is my privilege as your retiring President to address you, to draw your attention to Entomological subjects, and more especially to the operations of the insect world about you and to record the progress or decline of those noiseless disturbers of our peace—injurious insects.

The City of Ottawa being one of the great centres of our lumbering interest, it seems fitting that I should on this occasion call your particular attention to some of those insects most injurious to our pine forests. The losses occasioned by the destructive work of borers in pine trees both before and after they are cut are unfortunately too well known to those interested in the lumber trade, although the sufferers may not be familiar with the life histories of their enemies so as to be able to recognize them in the various stages of their existence. The lumberman suffers from the work of a number of destructive species, nearly all of which inflict their greatest injuries during the larval stage of their existence.

There are three families of beetles in which are included the greater number of our enemies in this department. I allude to the longicorns or long-horned beetles, *Cerambycidae*; the serricorn or saw-horn beetles, *Buprestidae*, and the cylindrical bark beetles, *Scolytidae*. To go over this long series in detail would weary you. A brief sketch of the life history of a single example in each family will serve as representatives of the whole.

One of the most destructive of the species included in the *Cerambycidae* is a large grey beetle with very long horns, known to Entomologists under the name of *Monolammus confusus*, and popularly in this district as

the "Ottawa Cow." Where trees have become diseased from any cause, or where a fire has ravaged a pine forest and scorched and partially destroyed the timber, or where logs after being cut have been allowed to remain a season in the woods or in the mill yard—there these insects gather and soon multiply to a prodigious extent. The mature insect is over an inch in length; the antennæ of the male reaches the extraordinary length of from two to three inches, while those of the female are shorter. The female lays her eggs in the crevices of the bark, where the larvæ when hatched eat their way into the wood, burrowing extensive galleries through the solid timber; when mature they are large, white, almost cylindrical, footless grubs. They pass their chrysalis stage within their burrows, and the perfect insect on its escape eats its way out through the bark. There are about a dozen species in this family known to be destructive to pine.

Most of the insects belonging to the family *Buprestide* may be recognized by their brilliant metallic colors; they have very short antennæ which are notched on one side like the teeth of a saw, and are often hidden from view by being bent under the thorax. *Chalcophora liberta* is one of the most destructive to pine trees, and its history is very similar to that of the long-horned beetle just described, but the larva is of a different form, and has the anterior segments or rings of the body very large, reminding one of the appearance of a tadpole. The perfect insect is about three-quarters of an inch long, of a brassy or coppery hue, with the thorax and wing-covers deeply furrowed by irregular longitudinal depressions. Dr. Fitch enumerates twelve species belonging to this family which are known to be injurious to pine. Additional information in reference to these beetles may be found in an article contained in the last annual report of our Society, by Mr. J. Fletcher, of Ottawa.

The cylindrical bark beetles, *Scolytidæ*, are also a numerous family, eight species of which are known to attack pine. The boring *Hylurgus*, *Hylurgus terebrans*, is probably one of the commonest. This beetle is about a quarter of an inch long, of a chestnut red color, thinly clothed with yellowish hairs, and is found during the month of May. The larva, which is a small yellowish-white footless grub, bores winding passages in every direction in the inner layers of the bark of the tree, and also through the outer surface of the wood.

In some parts of our Province pines are greatly injured and sometimes killed by the attacks of a woolly bark louse, which covers parts of the

trunk and branches with a white cottony secretion, under the protection of which myriads of tiny lice live, puncturing the bark with their sharp beaks and exhausting the trees by feeding upon the sap.

While we are mainly interested in the preservation of our mature forests, the future of our country demands that we shall not overlook the young growth on which the lumber supply fifty or a hundred years hence must largely depend, and which it should be the policy of our rulers to protect as far as possible. Most of the governments of Europe are now fully alive to the importance of this matter, and are annually spending large sums of money in establishing young forests. Two years ago I called your attention to an insect then recently discovered by Prof. A. R. Grote, of Buffalo, which was greatly injuring the terminal shoots of both the white and red pines in Western New York; it was the larva of a small moth, *Nephoteryx Zimmermani*, which fed under the bark, causing a free exudation of resinous matter from the wounds it made, followed usually by the death of the twigs infested. Since then it has been found over a much wider area than was at first anticipated, and I have no doubt but that it is to-day materially retarding the growth of young pine trees in many portions of our Province.

At the recent meeting of the Entomological Club of the American Association for the Advancement of Science (where our Society was represented by your President and Vice-President), Mr. S. H. Scudder, of Boston, submitted some observations on another lepidopterous insect which is injuring the young pines growing on the Island of Nantucket. It is a species of *Retinia* closely allied to *Retinia duplana* of Europe. The moth lays her eggs near the tips of the twigs, down which the young larvae burrow, killing them outright, and thus stunting and almost destroying the trees. Prof. Comstock, of Washington, also referred to two other species of *Retinia* which he had observed injuring the pine trees in that city.

In addition to all these there are a score or two of species of insects which are known to devour the leaves of the pines, damaging them in some instances very much. From the facts enumerated it is evident that we are suffering serious loss in all our lumbering districts from the silent workings of these insidious foes, and since in some measure to be forewarned is to be fore-armed, I desire to call the special attention of those immediately concerned in the prosperity, present and future, of the lumbering interests of our country, to this important subject. Unfortunately it does not as yet seem to be within the power of man to do much directly

towards restricting the operations of these enemies to our forests ; yet this should not deter us from studying their habits and history, since an intimate acquaintance with these may result much more to our advantage than we now anticipate. A few trees, such as a belt, or a group planted for shelter or ornament, may be protected from the leaf and twig destroyers by syringing with a mixture of Paris Green and water in the proportion of a teaspoonful to a pail of water, and the bark lice may be killed by the use of alkaline washes applied with a brush or broom, and a timely application of the same will prevent the operations of the borers ; but it is scarcely possible that such remedies can ever be applied over extended areas of forest. It is, however, gratifying to know that in addition to the numbers devoured by our insectivorous birds, that almost every injurious species is in turn attacked to a greater or less extent by insect parasites of the most active habits, who seek out and destroy these pests with ceaseless diligence ; were it not for these friendly insects the destructive species would be far more numerous individually than they now are.

The question as to how best to check the increase of destructive insects is of the greatest practical importance, and probably no insecticide has of late played so important a part in this connection as Paris Green, which is a compound of arsenic and copper, comparatively insoluble and a substance which seems admirably qualified for the destruction of insect life. Besides its special use as a potato-beetle killer, it can be successfully used to destroy any and every insect which eats the leaves of plants, shrubs or trees. So poisonous an agent should be handled with caution if accidents are to be prevented, and it is a matter of great regret that in consequence of carelessness in its use the lives of many valuable animals have been sacrificed, and occasionally even human lives have been imperilled or lost. From the ease with which it can be procured it has also been resorted to in several instances by those determined on suicide. These unfortunate occurrences are greatly to be deplored, and every possible precaution should be taken to avoid accidents. It is quite a common occurrence for painters, hardware dealers and general merchants to sell Paris Green and to send it out without label of any sort, and sometimes the parcel is very insecurely put up and packed with groceries and other articles for home use in the most indifferent manner. Such recklessness should not be permitted and no one should be allowed to sell any substance so dangerous unless it is properly labelled with the name of the article and the word "Poison" prominently attached ; with such precau-

tions generally adopted many accidents which now occur would be prevented. It has been urged by some that so many evils have attended the use of Paris Green that it does more harm than good, and that its use should be discontinued ; but in this I am not prepared to concur, as I am satisfied that without it, unless some suitable substitute were found, the potato crop in many localities could not be preserved from destruction. If reasonable care is exercised and the powder be used mixed with water, there is no danger attending it, and its use in this manner in the proportion already mentioned of a teaspoonful to a pail of water and applied with a whisk, is not only safe but most economical.

For some years past experiments have been made with various other substances with the view of finding a substitute for Paris Green which would be less dangerous in the hands of the careless, and among them I believe none have been used with greater success than common blue vitriol or sulphate of copper, in solution in the proportion of about an ounce to a pail of water, and applied in the same manner as the Paris Green mixture. This article is worthy of, and will doubtless receive, a more extended trial, as its use under any circumstances would be attended with but little danger. For the destruction of household pests Insect Powder has lately attracted much attention, and is probably the most valuable agent we have for this purpose, and it is quite harmless to man and the higher animals. There are two sorts of this powder, known in commerce under the respective names of Persian and Dalmatian Insect Powder ; the former is the powdered flowers of *Pyrethrum roseum*, the latter of *Pyrethrum cinerariae-folium*. The Dalmatian Powder is most highly esteemed. The powder is diffused through the atmosphere by means of a small bellows, or insect gun, and in a very short time it brings house-flies, cockroaches, etc., on their backs, and dusted among bed-clothing is equally effectual on noxious pests there. It does not at first kill the insects outright, but paralyzes them so that they are unable to use either legs or wings, and after remaining in this condition many hours and sometimes days, a solitary individual here and there will either wholly or partially recover, but the great bulk of them die.

A very active blue-bottle fly placed under the influence of the powder was brought on its back in one and a half minutes. After six minutes it performed some remarkable evolutions, throwing itself about in the most desperate manner by the aid of its wings, for by this time it had lost the use of its legs ; in a few moments more it was quiet, but still able to move

its legs, and this power it retained for two days, after which it was lost sight of. The same powder was applied to a full-grown grasshopper; immediate uneasiness was manifested, and within two minutes its hind legs were partially paralyzed so that they could not be used with much effect. The first symptoms were a general rubbing of the legs against each other and a peculiar backward movement of the body; in four minutes there was a trembling of the whole frame, while all the legs were so much affected that locomotion was very feeble. In six minutes the insect had lost all control over its limbs, and in nine minutes it was on its back with no power to recover its natural position. A second patient manifested precisely similar symptoms, but was not affected quite so rapidly. Applied to house-flies in a room, some of them begin to fall powerless in two or three minutes; others will remain active several minutes longer, but manifest constant uneasiness, evidenced in unnatural movements of wings and legs, and a frequent thrusting out of the proboscis. Having operated in a room one day about noon, I swept up after a few minutes several hundred flies and put part of them in a tumbler covered with a small plate, and the remainder in a chip box which I carried in my pocket for the first day, where the flies would receive some warmth from the body. After five or six hours the box was opened, when several crawled out or flew with a very weak, short flight; these were evidently recovering; the others remained on their backs, many of them moving their legs now and then. At the same time those in the tumbler were looked at; all were on their backs, but still alive. In twenty-four hours afterwards those in the glass were in the same helpless condition, barely alive, while in the box three more had so far recovered as to be able to walk, and one of them could fly a little. The following day they were examined again and every one of those in the box were dead, while in the tumbler out of 137 there were 22 alive, which number was reduced to three the following day; this small remnant survived two days longer, when all died.

In the use of Insect Powder on the green Aphis which infests house plants, the same course was observed; the insects dropped from the plants as if paralyzed, and after a short time were incapable of locomotion. After two days they were found still alive, but in this instance there was no sign of recovery in any of them, and all died within two or three days afterwards, but whether from the direct effects of the powder or from starvation I was unable to decide.

When I addressed you last year I referred to a strange disease which

had destroyed large numbers of that destructive pest, the Forest Tent Caterpillar, *Clisiocampa sylvatica*. After the disease had reached a certain stage the larvæ remained motionless, retaining their hold on fences and the trunks of trees ; shortly, although in appearance they were quite natural, when touched they were found to be dead, and their bodies were so decayed as to burst with a very gentle handling. Subsequent observations convinced me that this was the result of a fungoid disease to which caterpillars, as well as some perfect insects, are very subject. A similar disease sometimes attacks the silk-worm and causes great devastation, and the common house-fly is liable every autumn to die from the effects of a fungus which multiplies with amazing rapidity within the fluids of the fly's body, soon destroys life and forms a circle of luxuriant growth all around its victim. Examples of this may be found on the windows of almost every dwelling during the month of September. Some years ago a learned European professor claimed that he had proved the identity of this fungus with the common blue mould and also with that of yeast ; and in proof used the fungus of the fly for the purpose of raising bread, and showed that it was possible to brew beer with the common mould. The close relationship, if not the actual identity, of these three was thus established. Quite recently it has been proposed by Dr. Hagen, of Cambridge, Mass., to use a diluted solution of yeast in water with an atomizer as a means of destroying noxious caterpillars and other insects by introducing disease among them, and it seems quite likely that the use of this remedy may to some extent prove effectual.

The Cabbage Butterfly, *Pieris rapæ*, having pretty well colonized the northern portions of America, is still traveling southward. During the present season it has been reported as common in many localities in the State of Alabama, and has nearly reached the Gulf of Mexico ; it seems as capable of adapting itself to extremes of heat as of cold. The Forest Tent Caterpillar, *Clisiocampa sylvatica*, which has been so very numerous and destructive in our neighborhood for two years past, has almost disappeared. The Colorado Potato Beetle seems to have fairly established itself in several places in Europe, and if it proves as prolific there as here it will be rapidly disseminated. The Wheat Midge, *Cecidomyia tritici*, has appeared in the neighborhood of Port Hope, Ont., but not to any alarming extent. The Plum Curculio, *Conotrachelus nenuphar*, has been common as usual, while reports have been received from several districts of the increasing prevalence of the Codling Worm, *Carpocapsa pomonella*.

Our journal, the CANADIAN ENTOMOLOGIST, has been well sustained during the past year, and through the kindness of our esteemed contributors we have been enabled to present our readers with many original papers of great practical value. Mr. W. H. Edwards, of West Virginia, has continued his very useful and valuable papers on the life histories of our butterflies. Dr. Bailey, of Albany, N. Y., has given us an interesting description of the various stages of *Cossus Centerensis*, illustrated by an excellent lithographic plate. Many new species of insects have been described by Messrs. A. R. Grote, W. H. Edwards, V. T. Chambers, Prof. Fernald and others, besides which we have published a very large number of papers of general interest.

Among the more important recent contributions to our Entomological literature may be mentioned a new edition of the Catalogue of the Described Diptera of North America, by Baron Osten Sacken; the Coleoptera of Florida and Michigan, by John L. LeConte, M. D., and E. A. Schwarz; Report on the Insect and other Animal Forms of Caledonia Creek, New York, by J. A. Lintner; the Coleoptera of the Alpine Regions of the Rocky Mountains, by John L. LeConte, M. D.; on the Collection of Insects made by Dr. Elliot Coues in Dakota and Montana—the Orthoptera by Cyrus Thomas, Hemiptera by P. R. Uhler, Lepidoptera by W. H. Edwards; Notice of the Butterflies Collected by Dr. Edward Palmer in Southern Utah and Northern Arizona, in 1877, by Samuel H. Scudder; and an account of some insects of unusual interest from the Tertiary Rocks of Colorado and Wyoming, by the same distinguished author. The elaborate and voluminous report of the U. S. Entomological Commission on the Rocky Mountain Locust, with maps and illustrations, issued in 1878, did not reach us in time to be noticed at our last annual meeting. It is a work which has involved great labor, and besides containing much that is new, covers the entire field of our knowledge in reference to this destructive pest. Prof. C. V. Riley, of Washington, has issued a special report on the Silk-worm, being a brief manual of instructions for the production of silk, with illustrations. Prof. A. R. Grote has written Preliminary Studies on the North American Pyralidæ, and Samuel H. Scudder a Century of Orthoptera. Several additional numbers of Edwards' magnificent work on North American Butterflies have appeared, with charming plates.

The members of the Entomological Commission of the United States are devoting their attention this year especially to the Hessian Fly, inves-

tigating its habits, preparing statistics of the losses occasioned by its attacks, and testing the various remedies which have been suggested for its destruction. In a circular issued in June last they solicit the co-operation of Entomologists, many of whom will, I trust, be able to render them efficient aid in this good work.

During the year death has removed from our ranks three well known laborers in the Entomological field, Dr. Asa Fitch, late State Entomologist of New York; Dr. Hermann Loew, the eminent German Dipterist, who has done so much to advance our knowledge of American Diptera; and Frederick Smith, the renowned English Hymenopterist. Thus year by year we are called to mourn the loss of those whose names, for their works' sake, we revere. They have gone to their reward; we live to labor. Let us each endeavor to make the best possible use of the time and opportunities we have, however limited they may be, and diligently and contentedly labor in the sphere in which God has placed us; prompted by pure motives, may we with earnest effort probe deep into the secrets of nature, and draw from thence treasures new, so that when we pass away we may leave behind us some little lustre which may lend a light, however dim, to those who will fill our places.

I have the honor to be very sincerely yours,

WM. SAUNDERS.

ON THE PREPARATORY STAGES OF CERTAIN FLORIDA BUTTERFLIES.

Editor Canadian Entomologist:

I have received from Dr. A. W. Chapman, of Apalachicola, descriptions of preparatory stages of several species of Florida butterflies, made by him 1870-1872, with permission to publish such as I saw fit. I send one instalment confined to the Hesperidæ, and where it seemed desirable I have added notes of my own in brackets. Except in case of *Eudamus Proteus*, wherever Dr. Chapman has described larvæ which are also figured by Abbot, in Smith-Abbot, Insects of Georgia, or by Boisduval and LeConte, after drawings of Abbot, the description differs essentially from the

figure, and I am the more confirmed in the opinion which I have for some time entertained, that much of Abbot's work in this direction is unreliable.

W. H. EDWARDS.

1. *PAMPHILA PHYLEUS*, Drury.

MATURE LARVA—Length .7 inch ; fusiform ; of a uniform dull green, and thickly granulated with pale points ; collar on second segment dark brown ; head small, smooth but punctulate, dark brown.

CHRYsalis—Length .5 inch ; nearly cylindrical ; the head, thorax and abdomen pubescent ; color pale green ; a black line, interrupted on the posterior segments, extends from back of head case to last segment ; a lateral black streak on the thorax and a lateral row of black spots on the abdomen ; more or less punctured throughout ; the wing cases paler, contracted behind into a subulate point ; anal hook stout, spine-like. The imago emerged 2nd July. The larva fed on grass.

(In Bois. and Lec., this larva is represented as pale green, with two broad longitudinal sub-dorsal darker green bands, and a stripe above the feet. The chrysalis accompanying is green with no apparent marks except a row of reddish points on side of abdomen.)

2. *PAMPHILA BRETTUS*, Bois. and Lec.

EGG—White, smooth, hemispherical ; laid on *Paspalum setaceum* (grass) July 4th ; hatched 10th July.

YOUNG LARVA—White with large black head, and black collar. On 21st July one-half inch long ; color greenish-white. Aug. 3rd, 1 inch ; fusiform ; pale green with a dark dorsal stripe and an obscure line on either side ; collar black, and separated from it on either side a black dot ; spiracles black ; head rounded, projecting obliquely, granulated with black, the sides of face and two streaks on upper face yellow-white. Made chrysalis Aug. 5th.

CHRYsalis—.75 inch ; color pale green, the abdomen whitish ; wing cases smooth, faintly veined ; the antennæ cases extending in a filiform point to the end of the abdomen ; on either side of head case a dark point, and a row of dark points along side of abdomen. Imago emerged 14th August.

The larva forms a tube with the leaves in which it lies concealed during the day, feeding mostly at night.

3. *PAMPHILA ACCIUS*, Smith-Abbot.

MATURE LARVA—Length 1.33 inch ; slender ; nearly white, but under the lens mottled and dotted with darker lines and points, the rings on the posterior half of each segment more prominent and less dotted ; collar black ; head rather small, oblique, oval, flattened frontally, white with a black band around top and sides, a black streak down middle of face and a short black streak on either side of this last, and not reaching the band at top.

CHRYsalis—Slender, smooth, white ; the head case tapering into a slender pointed beak.

The larva was found 2nd Aug., wrapped in the leaves of *Erianthus alopecuroides* (a grass).

(Abbot figures this larva as nearly white, with five distinct greenish longitudinal bands extending from head to last segments, and without collar ; the head striped with reddish. He gives the food plant as *Glycine frutescens*.)

4. *PAMPHILA MACULATA*, Edw.

MATURE LARVA—Length 1 inch ; slender, pale green, finely pubescent ; the last two segments deeper green ; collar light brown ; head oval, oblique, densely pubescent, slightly granulated, light brown.

CHRYsalis—Length .8 inch ; cylindrical, dull green ; pubescent, especially about both extremities ; the head case blunt, wing cases smooth ; on 8, 9 and 10 are two flat tubercles on ventral side ; the anal hook broad, triangular. (Food plant not given.)

5. *PAMPHILA ARPA*, Bois. and Lec.

MATURE LARVA—Length nearly 2 inches ; pale green striped with yellow, the segments after 2 thickly lined with fine streaks of green and yellow ; collar black edged before by yellow ; spiracles black ; head high, narrow, blackish, bordered around top and sides by white, and with two white incurved (concave to each other) streaks on upper third of face ; these separated by velvety black.

CHRYsalis—Length 1.2 inch, nearly cylindrical, light brown, covered with a white powder ; the abdominal segments pubescent ; the wing cases prolonged into a short subulate point ; the abdomen long, tapering slightly, and the end bluntly rounded. The butterfly emerged 21st Aug.

The larva feeds on saw palmetto, forming a tube of the bases of the fan-like segments of the leaves, in which it lies concealed and in which it changes.

(Bois. and Lec. figure the larva and chrysalis, after Abbot. The larva is shown as pale green with a macular darker sub-dorsal stripe, and a double band on side. The head is almost spherical, yellow, edged with red, and with a red curved stripe on face. The chrysalis is much smaller than Dr. Chapman represents, and as he gives a pencil drawing of it, I see that it is of quite different shape from Abbot's, which has a short abdomen, tapering nearly to a point.)

6. PAMPHILA PALATKA, Edw.

MATURE LARVA.—Length 2 inches; cylindrical; collar a black line connecting two black lateral dots; anal plate semi-circular, projecting; color of body yellowish-green, thickly dotted with minute, dark, hair-tipped tubercles; spiracles black; under side bluish; head obliquely projecting, brownish, the upper part of the face white and marked by three black stripes. Feeds on saw grass (*Cladium effusum*), drawing the faces of the strongly keeled leaves together, and in the tube thus formed lying concealed when not feeding. (Chrysalis not described.)

(I believe this species is either same as *Bulenta*, or at most but a variety of that. The larva and chrysalis of *Bulenta* are figured in Bois. and Lec., after Abbot, and both are scarcely to be distinguished from his figures of corresponding stages of *Arpa*. In the former the sub-dorsal band is continuous, instead of macular, and in the latter the lateral bands are mostly obsolete. There is thus no agreement with Dr. Chapman's description of *Palatka*, in which the whole upper side is yellow-green, without lines or bands.)

7. PAMPHILA DELAWARE, Edw.

MATURE LARVA.—Length 1 inch; fusiform; color bluish-white; collar black, ending in a black dot on either side; a lunate black band on 13 and anal plate; the surface thickly dotted with minute black tubercles; head oval, oblique, white, smooth, slightly bilobed; a black band about top and sides, a black vertical streak on middle face and a short streak of same color on either side this last.

CHRYSALIS.—Narrow, greenish-white; the head case blunt, black, tubercled and bristly; the last segment black. The larva was found

wrapped in a leaf of *Erianthus alopecuroides*. The imago emerged 30th August.

8. *EUDAMUS PROTEUS*, Linn.

MATURE LARVA—Length 1.5 inch ; fusiform ; a fine dark dorsal line, a bright yellow sub-dorsal band which is dilated on the 12th segment, and a pale green line along base of body ; the dorsal space between the bands gray dotted with black and yellowish arranged in transverse lines ; the sides gray, with the upper half dotted with black ; collar lustrous black ; anal plate yellow, greenish in middle ; under side pale green ; legs black, pro-legs yellow ; head large, round, brown, pubescent, slightly depressed at top ; a yellow spot on each side of the mouth narrowing upwards and fading into the light brown of upper part of face.

CHRYSLIS—Covered with a white powder. The larva feeds on Leguminosæ, on *Phaseolus perrennis* and *Cliteria Mariana*.

(Abbot's figure of this larva agrees with the above description, but the figure given in Bois. and Lec., after Abbot, has scarlet patches about head and body not found in the larva, and is otherwise an incorrect as well as coarse copy of Abbot.)

ON THE EARLY STAGES OF SOME GEOMETRIDS.

BY L. W. GOODELL, AMHERST, MASS.

Tetracis crocallata Guen.

Mature larva, one specimen—Head brown, much narrower than the body ; two large dark brown spots in front. Body stout and very slightly attenuated anteriorly, the 1st and 2nd rings much narrower than the rest and retractile into the 3rd. About a dozen minute black tubercles on each ring. Reddish brown covered with numerous, wavy hair lines ; paler beneath with a large dirty brown patch enclosing two light brown spots on the 6th and 7th rings. Length when at rest 23 mil. ; when crawling 28 mil. Feeds on the Chestnut. Became a pupa July 15th, within leaves drawn together with a few threads.

Pupa—Length 17 mil. ; ashen gray, tinged with reddish and speckled with brown ; a brown dorsal stripe, obsolete on the abdominal segments.

Thorax paler with a small dorsal brown spot. Head brown with a vertical red streak. Abdomen dark brown beneath speckled with reddish, the anal segments with a transverse dark brown dash above. Wings pearly ash with a submarginal row of seven brown spots. Caudal spine round with two long hooked forks; four slender bristles at the base, two above and two beneath, very much hooked at the tips.

Therina endropiaria Pack.

Mature larva, one specimen—Head wider than the first segment of the body, roundish and greenish gray, brown on the sides. Body rather slender and attenuated anteriorly; color a mixture of brown and greenish gray; a small angular tubercle on the side of each of the 2nd, 5th and 6th rings, and a dorsal pair of the same on the 6th, 8th and 7th, those on the 8th smaller than the others. Length when at rest 32 mil.; when crawling 36 mil. Feeds on the Oak. Pupated Sept. 4th, just beneath the surface. Moth emerged May 19th.

Acidalia enucleata Guen.

Mature larva, one specimen—Head not so wide as the body, gray with a vertical brown streak on each side. Body slender and attenuated anteriorly, pale brown streaked and variegated with darker brown. Length when at rest 41 mil.; when crawling 46 mil. Feeds on the Blueberry (*Vaccinium*). Changed to a pupa in a thin cocoon on the surface, June 29th.

MEETING OF THE ENTOMOLOGICAL CLUB OF THE
AMERICAN ASSOCIATION FOR THE ADVANCE-
MENT OF SCIENCE.

(Continued from Page 177.)

Prof. Fernald stated that he had received from Oregon and Washington Territory specimens of *Retinia duplana* and *sylostrana* identical with the European forms, and further referred to the fact that in America the species of Tortricidæ are more abundant in the West than in the East.

Mr. Grote called the attention of the members to the ravages of *Nephoptyx Zimmermani*, which he believed had inflicted more injury on young pines than any other insect; it is found throughout the northern and north-western parts of New York State. Mr. Grote laid particular stress on the fact that the European pines imported and sold by nurserymen are much infested, and desired to call public attention to this matter. With regard to the use of Paris Green as an insecticide, he thought that it was doubtful whether the injury caused by it was not greater than would occur from the Potato Beetle were it allowed to go unmolested; and instanced the loss of a stallion valued at \$2,500, poisoned by Paris Green, and also referred to the frequent injuries to animals and man reported in the newspapers. This opinion was opposed by other members present, who stated that but for the use of Paris Green or some such poison, it would be impossible in some sections of the country to grow potatoes at all.

Prof. Fernald referred to a Tortrix found in Maine, *Tortrix nigridia*, which had very much injured the pines there; he had collected a large number of the larvæ and chrysalids of this insect, and from them, besides the moths, had obtained many ichneumon parasites and also several hair snakes. Prof. Fernald embraced this opportunity of calling the attention of the members to the condition in which he had found the types of the North American Tortricidæ. Many of them were being destroyed by the verdigris formed by the corrosion of the pins on which they were mounted, and in some instances this verdigris has accumulated to such an extent as to burst the bodies of the insects. To avoid this difficulty he has used japanned pins, and found that when thus coated they remained free from corrosion.

Mr. Grote remarked that *Scolioptyx libatrix* was very widely distributed in this country as well as in Europe, being found here from Hudson's Bay to the Southern States. He also referred to Mr. Grey's discovery that *Limenitis arthemis*, *disippus*, *ursula* and *proserpina* are connected by intermediate individuals, and that this indicated that they had not long been separated from a common stock, and expressed the opinion that *arthemis* was probably nearest the original form.

Mr. Scudder, referring to the same subject, regarded *disippus* as probably the original type of this species.

Mr. Lintner held that it was premature to conclude that the different

species of *Limenitis* are identical until it could be proven positively by rearing the one supposed species from the eggs of the other.

Mr. Scudder exhibited a piece of a woody root which was represented as coming from the interglacial beds of clay near Toronto, Ontario. This root proves by microscopic examination to belong to a species of *Juniper* and is bored by an insect, probably a *Scolytus*, but one which differs materially in its habits from any known species now existing. Mr. Scudder also referred to the abundance of insect remains which he had found in the peat deposits on the Island of Nantucket; from one mass of about a cubic foot he had obtained 300 fragments of *Coleoptera*, among which were several which he had been unable to refer to any species now known to exist; a number of these specimens were shown to the members.

Mr. Austin exhibited specimens of a wasp, *Polistes metrica* Say, infested with parasites.

On motion the meeting was adjourned until 8 p. m.

EVENING SESSION.

Prof. Comstock exhibited specimens of a small *Pyralid* which is carnivorous, feeding in the larval state on the maple tree bark-lice, under the cottony matter secreted by the lice. He had bred forty of the moths fed in this way.

Mr. Scudder drew attention to a very singular fossil, of which he had obtained about 100 specimens, somewhat resembling the larva of an insect, but yet quite different from anything hitherto known. His remarks were illustrated by a figure of the object. It consists of only six segments.

Mr. Barnard exhibited specimens of *Phymata erosa*, which has proved quite destructive to other insects; they have been known to destroy quite a number of *Pieris rapæ*. Mr. Barnard exhibited a number of specimens which had been caught on the burrs of the Burdock.

Prof. Riley stated that *Pieris rapæ* was now quite common in Alabama; it had been seen as far as Selma, but had not yet reached Mobile. Mr. Scudder remarked that it had been found in Savannah, Ga., two years ago.

Prof. Comstock had received specimens of the Colorado Potato Beetle this year from Manitoba, and thought that this was the farthest point north it has yet reached.

Mr. Saunders made some remarks in reference to the capture of insects by the flowers of a species of *Bidens*, probably *chrysanthemoides*; the

insects which he had observed thus captured were Dipterous, all of whom had been caught by the mouth ; some were found dead, others still living, but unable to withdraw their proboscis.

(To be Continued.)

NEW NOCTUIDS.

BY A. R. GROTE, BUFFALO, N. Y.

Tamila velaris, n. s.

Thorax clothed with mixed scales and hairs. Middle and hind tibiae armed. Fore tibiae with a row of spines on each side, four in number, increasing in size to the end of the joint. Front full, thickly clothed with mossy scales. White ; with ochre shading. Fore wings with a wide arcuate sub-basal ochre band ; a more diffuse band of similar shape crosses the middle of the wing ; beyond this the reniform spot, ferruginous, incomplete, with a prominent outer dot. Posterior line diffuse, interrupted. Subterminal space narrow, shaded with ochrey. Terminal space showing a white triangle before apices and again white below vein 4 ; an ochre stain from apices to vein 4. Hind wings stained with yellowish. Beneath yellowish dusky with a subterminal, shaded dusky fascia on primaries. *Expanse* 23 mil. *Hab.* "Caliente, California," Hy. Edwards, Esq., No. 7,173.

This species resembles *nundina* rather than *Meadii*. A single specimen, possibly faded.

Tamila vanella, n. s.

♂. Thorax clothed with mingled scales and hair. Tibiae armed ; eyes naked. A small dark species recalling *tertia* in the ornamentation of primaries. Primaries dark blackish brown with the median space ochrey whitish. Orbicular absent ; reniform large, brownish ; below it descends the dusky median shade near to the outer line. Costa on median space brown. Inner line white, lined within by black, narrow, upright, twice indented, forming three scallops. Subterminal line a series of pale, black ringed dots. Fringes blackish, interrupted with brown. Hind wings black with a sub-basal white fascia spreading on costa ; beyond, a discal white dot ; fringes whitish. Beneath distinctly marked, shaded with reddish on costal regions ; median fields white, with large black

discal marks. Both wings black at base; subterminal black bands, spreading to anal angle on secondaries. Body beneath pale olivaceous. Thorax olivaceous shaded with brown. *Expanse* 17 mil. *Habitat* Nevada, Mr. E. L. Graef. The single specimen is fresh, but the fore legs are broken off. The outer line on primaries is white, indistinctly margined, even, slightly exserted, nearly upright.

Lygranthoeccia separata, n. s.

♀. Allied to *marginata*, *Thoreau*i and *saturata*. Fore wings ochrey purplish with a white cast. Lines regular, white, the inner lined with dusky on the inside, the outer dusky margined on the outside. The inner line greatly medially exserted, the angle obtuse. The outer line subflexuous, outwardly bent opposite the disc, where it nearly touches subterminal line. Subterminal space darker than the rest of the wing, narrow; s. t. line white, indented slightly opposite cell and before anal angle. A black discal blotch; fringes pale. Hind wings whitish with terminal interrupted black band and heavy black discal spot. Beneath pale with subterminal shades, two black discal marks on primaries, one on secondaries. *Expanse* 28 mil. *Habitat* Nevada, E. L. Graef.

Tarache lanceolata, n. s.

By its narrow and long primaries allied to *angustipennis*; differing by the white secondaries shaded with dusky before the fringes and the color of primaries. These are white along costa to subterminal line and below the middle of the wing deep olive green; the green color twice cutting the costal stripe at the anterior and posterior lines, which are vaguely defined. Below apices are two superimposed black longitudinal dashes very narrowly edged with white; below them a white diffuse shade widens to internal angle. The discal marks are evident, round, olive colored, the orbicular small. Fringe dusky, twice splashed with white. This form much resembles *angustipennis*; the apical ornamentation seems to differ strongly, as in the latter species the black dashes (reminding us of *Cerinthia*) are totally wanting. One fresh specimen, Belfrage, Texas, May 6, No. 744, red label. *Expanse* 24 mil. The dark thorax is shaded in front with white as in *angustipennis*.

Eustrotia retis, n. s.

Allied to *apicosa* (*nigritula*) and closely resembling that species. A little larger with darker secondaries. Primaries blackish with the anterior

line much as in *apicosa*; discal spots smaller than in its ally; posterior line straighter, without the prominent inward curve below the reniform, neither followed by a caraneous shade at this place as in *apicosa*. The posterior line is followed by two fine ochrey shade lines; beyond these the subterminal space is blackish, cut by pale scales on the veins. Subterminal line fine, pale, irregular. Terminal space dusky, no apical spot; terminal margin more angulated than in *apicosa*, being produced opposite veins 3 and 4; the difference in shape of wing is quite marked. Terminal line black, interrupted, preceded by a fine edging of pale scales. Beneath much as in its ally, the discal dot on secondaries larger. *Expanse* 28 mil.; Penn., Mr. W. H. Stultz; one male specimen.

Eustrotia secta, n. s.

A small species with the ornamentation of primaries recalling *synochitis*. Hind wings dark fuscous with paler fringes. Fore wings shaded with whitish gray at base; median space brown below the median vein and here shaded with black, so that here a darker internal patch is formed, reminding one of the green patch in *synochitis*. Orbicular wanting; reniform two superimposed black points. Subterminal line diffuse, perpendicular, twice outwardly exserted, brownish. A dotted ferruginous terminal line; fringes fuscous gray, interlined. Three black ante-apical costal dots, preceded by pale points. Lines indistinct, anterior outwardly arcuate. *Expanse* 18 mil. *Hab.* Massachusetts, Mr. Roland Thaxter, No. 16.

Oncocnemis aterrima, n. s.

Fore wings dead black with obliterate ornamentation. The small reniform may be distinguished ringed with white. The inner line is lost; outer line white, evenly curved opposite the cell, slightly bent inwardly below median vein. The subterminal space is washed with white behind the outer line and this portion of the wing is the most prominently ornamented. A series of whitish points indicates the subterminal line. There is a slight olivaceous powdering over the primaries and thorax. Hind wings dead black, with a median curved dark line brought into relief by a following pale shading; fringes whitish. Beneath black with a common median line followed by white streaks and shading. Eyes naked; fore tibiae with a stout claw. *Expanse* 22 mil. *Habitat*, Havilah, Cal., Mr. Hy. Edwards, No. 119. This species has a slight Heliothid appearance and differs much in markings from the others known to me in this genus.

CORRESPONDENCE.

DEAR SIR,—

The following note may prove of interest as showing the numbers in which the larvæ of *Zachnosteria fusca* may exist in a lawn without perceptible damage to the grass resulting.

On Sunday last, while walking through the Capitol grounds a few hours after a heavy shower of rain, I observed these larvæ in great numbers upon the stone pavement north and east of the Capitol building. I counted up to three hundred and then came to a spot where they were so thick that I had to give it up. I certainly saw *thousands*, nearly all of which were dead, either from heat or from having been trodden upon. Upon interviewing the Superintendent of the grounds, I learned that at this season of the year the grubs always make their appearance in like numbers after a hard rain. This gentleman informed me, and his statement was corroborated by several others, that frequently the sweepers of a morning in going over the walks would collect at the bottom of the hill as many as a *bushel* of the grubs. The pavement is edged on both sides by a two-inch curb, and the larvæ falling over this are unable to return; only those grubs inhabiting the earth near the curb would reach the walk, and the great numbers killed in this way after every shower afford an index to the immense number which the entire lawn must contain. Yet, in spite of this most serious drawback, as one would naturally call it, the grass over the entire plot is so fresh and green as to call for universal admiration.

The movements of the larvæ upon the smooth pavement were very interesting. The characteristic bend of the body unfits them for walking on smooth surfaces, and every live individual that I observed was upon its back, moving forward quite rapidly by the alternate expansion and contraction of the segments. This mode of locomotion seemed strange at first, but upon reflecting that the probable natural position of the larva in the earth is upon its back with its legs grasping the grass roots, it seemed not so unnatural after all. The strong transverse corrugations and rows of bristles upon the dorsum, taken in connection with the extremely business-like and natural air with which the larvæ took this position and the rapid progress which they made while in it, would seem to indicate that the back is used for locomotion with these insects more than has perhaps been suspected.

L. O. HOWARD.

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VOL. XI.

LONDON, ONT., NOVEMBER, 1879.

No. 11

MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCE- MENT OF SCIENCE.

(Continued from Page 197.)

In reference to the flight of butterflies, Mr. Lintner spoke of the enormous flocks of *Vanessa cardui* which had been seen in Italy, Spain and Germany during the summer.

Mr. Grote referred to an undescribed insect for which he proposes the name of *Oiketiscus Abbotti*; he had obtained the cases of this insect on the cotton plant in the South, but had not seen the imago until he had reared it. This species is figured by Abbot in unpublished plates in the British Museum; it is referred to also in Harris' Correspondence, edited by Scudder.

The election of officers then took place, with the following result :

President,	- . -	S. H. Scudder.
Vice-President,	- - -	A. R. Grote.
Secretary,	- - -	B. P. Mann.

After some discussion it was agreed that in future it was desirable that the President and Vice-President hold office for one year only.

The meeting then adjourned until the afternoon of the following day.

WEDNESDAY AFTERNOON SESSION.

Dr. Morris mentioned an interesting case of retarded development which had come under his notice, where a specimen of *Papilio asterias* remained in the chrysalis state two years and a half before the imago appeared.

Mr. Lintner remarked that instances of retarded development were common among the Bombycidae, and especially mentioned *acropia*; it

also occurs frequently among the Sphingidæ, where a specimen will pass over one season until the next in the chrysalis state ; this has been supposed to be a natural provision for the perpetuation of the species.

Mr. Bassett enquired whether in such examples they were not uniformly females. Mr. Lintner stated that in his experience both sexes were retarded.

Prof. Martin exhibited transparent specimens of gum copal in which were imbedded Hymenopterous insects. He stated that copal is a fossil resin of the post-tertiary period obtained chiefly from Mozambique ; that he had found in this resin about fifty species of insects, about one-third of which were Coleoptera, one-third Diptera and the other third of the remaining Orders ; two of the latter were Lepidopterous, one a Geometer, and the other he thought belonged to Zygaenidæ.

Mr. Bethune mentioned that he had found the larvæ of the Colorado Potato Beetle eating the leaves of the common Milk-weed, *Asclepias*.

Mr. Barnard had also seen one of these larvæ feeding on Milk-weed, but in this instance the larva was lighter in color than usual. Mr. Lintner remarked that it was unfortunate that the Potato Beetle would feed in the larval state on quite a number of different plants, and in the absence of vegetable food would sometimes feed on one another.

Mr. Saunders had observed this carnivorous propensity of the Potato Beetle larvæ on several occasions, and had seen the same among the Cut-worms, and in one or two instances among larvæ of the Lycaenidæ. Mr. Scudder had also observed similar habits. Prof. Comstock had noticed it especially in the Cotton-ball worm, *Heliothis armigera*.

Mr. Lintner invited Prof. Comstock to give some details in reference to the present plans and operations connected with his department at Washington. Prof. Comstock stated that he was endeavoring to work up a biological collection of insects on such a scale and in such a manner as shall be a credit to the Government. He has a large number of breeding cages, and an assistant who devotes his whole time to the rearing and mounting of insects. Special attention has been paid this year to insects feeding on clover, and the collection now contains over fifty species known to be destructive to this valuable crop. Prof. Comstock asked the aid of all Entomologists and assured them that any insects sent him would be well taken care of.

Mr. Scudder urged that Entomologists should recognize the fact that

it is of the utmost importance that a collection as complete as possible should be formed in Washington, and that it should assume a national character.

Mr. Barnard asked for some information as to the method of arrangement adopted in the collection referred to. Prof. Comstock stated that he arranged the insects in their usual order and place; with the insect, its usual food plant, and where it feeds on several or many plants, a memorandum is placed with such specimen containing a list of the plants; by this method much duplication is avoided.

Prof. Fernald was asked to give some explanations regarding his work on the Tortricidæ. He began the study of this group two years ago, commencing with those species found in Maine, but soon found that he could do nothing satisfactorily without taking in all those found throughout the United States and Canada. He has also found it necessary to study the European forms, and is now engaged in examining all these structurally, with the view, if possible, of improving their classification, and earnestly desires help from collectors in all parts of the country, especially in reference to the larvæ of the different species. He thinks that the character of the head, thoracic shield and anal plate will probably be of most value in separating the species.

Mr. Saunders reported that *Papilio cresphontes* had been found rather common both in the larval and perfect state in several parts of Ontario this season. Dr. Morris said that he had found *Papilio ajax* particularly local in its distribution, abounding in some localities, but very scarce in others.

Mr. Lintner stated that *Pholisora catullus* had not been found about Albany until three years ago, when a single specimen was taken; this year it is one of the commonest species in and about the city; its food plant is *Monarda punctata*.

Rev. C. J. S. Bethune referred to the great abundance of *Papilio philenor* one season many years ago in the neighborhood of Hamilton, Ontario; since then he was not aware that it had ever been found common in any part of Ontario.

A question was asked by Mr. Grote as to whether any of the species of *Cucullia* ever come to sugar. In reply, Dr. Bailey stated that he had captured three species of *Cucullia* and ten species of *Plusia* at sugar. Recently, when sugaring in a certain locality, he was surprised to find a

large number of Noctuids on decomposing animal matter, especially on some partially decomposed deer hides.

Mr. Grote reported having taken *Audela acronyctoides*; one male was captured this month at light. He thought that this was the first time it had been taken in New York State.

Mr. Saunders referred to the fact that in the location where he resided large numbers of the larvæ of *Clisiocampa sylvatica* had died from a fun-foid disease, and asked whether any of the members had tried solution of yeast as an insect destroyer, as lately suggested by Dr. Hagen.

Prof. Comstock stated that he had fed several larvæ on leaves dipped in yeast, but so far the yeast-fed larvæ had thrived remarkably well; his experiments had only been continued but a short time, hence he was not prepared to give any definite opinion on this subject.

The meeting then adjourned.

On Friday afternoon the closing session of the Club was held.

Dr. Morris stated that an apiarian in his neighborhood had been severely censured by some fruit-growers because his bees had pierced their peaches, grapes, etc., and destroyed the fruit; he asked whether the bees really were the original authors of the mischief, or whether they only attacked such fruit as had been previously pierced by birds, wasps and other insects. He knew that writers differed on this subject, and mentioned that Prof. Cook and Prof. Riley take opposite sides here.

Prof. Macloskie thought that the mandibles of bees were not strong enough to tear the outer covering of peaches or grapes. Prof. Comstock was of a different opinion. Prof. Riley remarked that in some articles which he had published in the *New York Tribune* he had proved that bees are the depredators, and made some further interesting statements on this subject.

Dr. LeConte spoke of the destruction of some of our valuable forest trees by various insects, and requested the members during the next year to collect facts and to report them at the next meeting, so that the nature of their depredations may become fully known and further remedies may be suggested.

Mr. Minot offered some very interesting remarks on the larvæ of a number of species of water insects, chiefly Dipterous, illustrated by many beautiful drawings of the larvæ highly magnified.

Mr. Lintner referred to the importance of the study of aquatic larvæ,

regretting that so little was known of their habits, and hoped that Mr. Minot would continue his studies in this direction.

From aquatic larvæ the conversation turned in the direction of that tiny tormentor, the mosquito, and marvellous accounts of its abundance in certain localities, and the sufferings of man and beast from its blood-thirsty propensities, were related by Mr. Scudder, Dr. Morris and others.

Mr. Riley made some remarks on the Cotton Worm, and stated that he had bred nine distinct parasites which preyed on this insect.

The time for adjournment having arrived, the members, after referring to the great pleasure they had derived from the interesting sessions of the Club, unanimously expressed the hope that all present might meet again next year in Boston.

IDENTIFICATIONS AND DESCRIPTIONS OF NOCTUIDÆ, WITH A NEW HETEROCAMPA, AND NOTES ON NEMEOPHILA.

BY A. R. GROTE, BUFFALO, N. Y.

Prodenia phytolacæ (Abbot & Smith, Vol. 2, 193, Pl. 97).

This species is sent me by Mr. Belfrage from Texas, under the number 706 (pink label). The insect has naked eyes, pellucid white and iridescent secondaries, the veins and external margin slightly soiled. It cannot be referred to *Xylomiges*, the type of which genus, the European *conspicillaris*, has hairy eyes, as have all the species referred by me to *Xylomiges* in my "Check List" and elsewhere. I think there can be no reasonable doubt that I have Abbot's species before me. It is, however, probable that this is Mr. Morrison's *Actinotia derupta*. If so, there seems to me no valid excuse for the new name, for Abbot's figures are quite recognisable, while the streaky fore wings of this species are unusually difficult for exact delineation. But what distinguishing marks there are upon them are indicated with sufficient exactitude in Abbot's plate, and I cannot hesitate as to the correct name for the species. The fore wings are confusedly marked, brown and gray streaked. The exterior line is

indicated by dark marks on the veins. The subterminal line is indicated by a yellowish streak, nearly touching the margin between veins 3 and 4, thence running obliquely inwardly and interrupted before internal margin. Fringes finely cut with pale yellowish. There is a more prominent dark streak along internal margin. It is smaller than the other species of the genus, and must not be confounded with any of the varieties of *Laphygma frugiperda*. With the identification of this species I think I have made out all of Abbot's published Noctuidæ. I am the first to re-discover *Adita chionanthi* of Abbot, Bull. Buff. S. N. S., 2, 63. I have referred Abbot's *vidua* to *desperata* Guen., and this reference has been generally accepted. There is, finally, a little doubt with regard to my identification of *calycanthata*, which perhaps cannot be removed until our species of *Homoptera* are better known.

Mamestra mucens (Hübner), Zutr. 415, 16.

This species is sent me under the numbers 704 and 705, by Mr. Belfragé. Under the first number dark specimens, suffused with brown, are included. They cannot be considered as anything but a variation of this species, now for the first time recognized by me. The eyes are hairy and I regard it as congeneric with and allied to the eastern *confusa*. The species I have referred to *Morrissonia* are structurally allied to those included by me under *Mamestra*, but the pattern of ornamentation is distinctive of the forms included under *Morrissonia*. Belfragé took *mucens* March 10 to 23. Gueneé puts this species in "*Xylophasia*," which contains a mixture of forms, some with hairy and some with naked eyes. I have separated the species in this respect.

Morrissonia infidelis, n. s.

♂. This name is based on a single male from Michigan which is in good condition. Eyes hairy. Color of *vomerina*, but more reddish brown. Collar pale and a pale spot at base of primaries; a black line edging the collar behind; thorax rich reddish brown. Costa pale at base, below median vein a rich red-brown shade extends outwardly, suffusing the wing. Reniform L-shaped, the lower part open, brown-filled, pointing to base of wing; this is surmounted by the upright part of the spot which is small. Orbicular small, oblique, lying over and touching the extension of the reniform. The usual pale shade bordering vein 3; terminally the

wing is a little darker. Hind wings pale fuscous with interlined white-tipped fringes; beneath reddish gray, with common line marked by black scales on the veins. *Expanse* 36 mil. Differs by the stigmata not being fused and pale, but finely ringed, separate and brown-centered. It may eventuate that *vomerina* and *evicta* are not distinct specifically.

Euleucyptera cumatilis Grote, Proc. Ent. Soc. Phil., 4, 330, pl. 2, fig. 6.

I have noted in the Bull. U. S. Geol. Survey, p. 798, vol. 3, some of the variations of this species, which is common in all the Colorado collections. One specimen now before me from that locality has the discal mark on hind wings evident; another has an indication of the reniform on primaries. These spots are an apparently variable character, since from Kansas Prof. Snow has sent me an immaculate form.

There cannot be any doubt that Mr. Strecker has re-named and re-figured this species, in the report of the Chief of Engineers, as *Heliothis sulmala*, on page 1862, plate 2, fig. 5. It is precisely the form with the discal marks evident, and from Colorado, fully described and figured by me thirteen years previously, which Mr. Strecker reproduces. The species has been identified by me in many collections and is well known to Western collectors under its proper name. I have given, Bull. B. S. N. S., 2, pp. 219-221, the structure of the N. Am. *Heliothis* genera. From this, if we are to take note of the armature of the legs, the vestiture of the body, the structure of the eyes, which, together with the form of the genital pieces and the venation, are all that we can use to establish genera in the Noctuidæ, we must consider that the genus *Euleucyptera* cannot be fused with *Heliothis*.

Ingura declinata, n. s.

♂. Allied to *præpilata* from Texas, but larger, with longer wings. Ornamentation and color of *præpilata*, but the secondaries are more than half white, leaving but a moderate fuscous band along external margin. On fore wings the exterior line is less even. Below the discal angulation it shows a rounded uneven projection about vein 3. Otherwise the ornamentation is much like *præpilata*; both stigmata present and the two usual sub-apical black terminal longitudinal dashes; at base the rounded discolourous patch bounded by the half-line. Beneath, however, *declinata* is largely whitish, with a white apical patch on fore wings followed by a brown shade, enclosing the costal white dots beyond the angulation of the

extra mesial line, which latter is double, with white included space, marked on costa, else fragmentary. *Expanse* 30 mil. California.

Ingura flabella, n. s.

Male antennæ with long hanging pectinations, apices simple. Smaller than usual and very dark and silky. Fore wings blackish, darker shaded at outer two-thirds over the exterior line, which is double, narrow, deep black, angulated on cell, thence inwardly and shallowly arcuate, even through its course. Subterminal line flexuous, pale, apparent below the angulation of exterior line. From this point it is outwardly roundedly projected over the lower median nervules nearly to external margin. Reniform small, pale ringed. Two short fine superposed black dashes on external margin opposite the cell. The wing shows here, below the apices, a faint whitish shade. A faint brown tint suffuses the darker portion of the wing over the exterior line. Fringes blackish, narrowly cut with pale. Hind wings velvety black with white fringes. Beneath fringes on both wings largely white or whitish. Costal white dots on primaries strongly relieved. Both wings are crossed by three or four black approximate, parallel, extra-mesial lines which show faintly against the blackish ground color. Fringes on primaries faintly marked with blackish. Body brownish black; breast pale. This species is recognizable by its small size, broad wings and black, white-fringed secondaries. *Expanse* 22 mil. Kansas.

Graphiphora erythrolita, n. s.

♂ ♀. Male antennæ bipectinate, the stem outwardly red. Moderately sized, the color varying from obscure hoary purple to reddish. All the markings indistinct except the broken black subterminal shade and the more or less black-marked reniform spot. Outer line double, broken into dots. Reniform narrow, outwardly oblique. Orbicular rounded, often vague, more or less distinctly filled with blackish. Lines marked on costa. Primaries with the apices acute, external margin outwardly rounded. Thorax concolorous. Hind wings fuscous, paler at base. Beneath grayish, irrorate with black. A faint common line and discal dots. *Expanse* 30 to 32 mil. California (Yosemite, Big Trees), Mr. Behrens. Ten specimens examined.

I have received from Mr. Belfrage four fresh male specimens of a new *Heterocampa* under the numbers 616 (yellow label) and 533 (violet label).

Heterocampa Belfragei, n. s.

This species is less distinctly marked than usual, of moderate size. The tone of the fore wings is olive gray with a narrow curved brown discal mark, and the broken subterminal line is composed of brown spots, indented on interspace between veins 4 and 5, and preceded by a diffuse whitish shade superiorly. A short narrow curved black basal streak. Median lines double, interspaceally lunulate, indistinct. Hind wings pale, more or less markedly dusky on costa and external margin, crossed by incomplete double extra-mesial shade lines. Thorax like fore wings; the tuft behind blackish, and the tegulæ edged incompletely with black. Beneath pale, without markings, except a dark common shade line near the margin of the wings, which is not always noticeable. March 23; April 15, 17, 21. Average expanse 36 mil. Clifton, Bosque Co., Texas.

Nemeophila caespitis.

In our original paper on this species, which we figured together with *N. cichorii*, Trans. Am. Ent. Soc., vol. 1, plate 6, we stated that the material illustrated in that paper, collected in California by M. Lorquin, was communicated to us by Dr. Boisduval, and that we adopted the specific names with which the specimens were labelled by Dr. Boisduval (l. c. p. 3). In the Annales de la Societé Ent. Belg., 1868-9, p. 75, Dr. Boisduval states that he gave us these species to illustrate and describes them himself as distinct from the European *plantaginis*, under these same names. It seemed to us that there must be sufficient characters to induce their separation, since an Entomologist so well acquainted with the European fauna as Dr. Boisduval, considered them to differ. Possibly they are only varieties of the European form, but seemingly well marked. Our responsibility is however limited to the publication of them on the authority of Dr. Boisduval.

Nemeophila geometrica Grote.

This form has proved to be merely a black form of *Nemeophila*. This reference was made by Dr. Packard in 1872, 4th Ann. Rep. Peab. Acad., p. 86. I originally described the species from a single defective specimen, without antennæ, in 1865, as a Zygaenid, allied to *Ctenucha*, in which I was in error. My mistake is paralleled by that of Dr. Boisduval, who described the black form of *Epicallia virginialis*, an Arctian, as a new species of the Zygaenid genus *Agarista*. Mr. Strecker has quite super-

fluously and in an exaggerated manner drawn attention to my mistake on different occasions, but if he would devote the time to looking up already described species before re-naming them and familiarize himself a little more with structure, his descriptions would have a value which they do not yet possess, and his time be better employed. I need not say that at the time I published these species there was comparatively little known on the subject and information was not so easily obtained as at present. A mistake like that made by myself, once corrected, has no further value in science, and in Mr. Strecker's hands is only used as an excuse for an unwarrantable personal attack.

Dr. Packard omitted the genus *Nemophila* from his Synopsis of the Bombycidae. It is not yet found in the Eastern States, but in the West and North. As collections come in it seems probable that we have but a single variable American form, but whether this is identical with the European cannot as yet be considered certain. The occurrence of this genus on the western coast increases the resemblance to the European fauna. Dr. Packard says regarding a species unknown to me: "*Platartia Scudderii* Pack., as I have long suspected, is a *Nemophila* and closely allied to *N. petrosa*, the anal claspers of the male being much like those of the latter" (l. c. p. 86). It may, then, turn out that the Californian forms are distinct from the North-western and that different species of these latter (*petrosa* and *Scudderi*) are to be separated. I wish here, however, merely to point out that we are not in a condition to come to positive conclusion as to these points as matters stand at present.

DESCRIPTIONS OF SEVERAL CRABRONIDÆ.

BY W. H. PATTON, WATERBURY, CONN.

HOPLISUS GRACILIS, n. sp.

♀. Length 10 mm. Black, clothed with an appressed brown pubescence as in *Hoplisus phaleratus* (*Gorytes phaleratus* Say); face with a very short silvery pile. Face, stripe between antennæ, anterior and posterior orbits, clypeus, labrum and mandibles (except the piceous tips), palpi, coxæ, trochanters and femora of anterior legs anteriorly, spot on

intermediate coxæ, posterior margin of collar, a small and a large spot beneath anterior wings, broad bands on scutellum and postscutellum, large ovate spot on each side of metathorax (irregular and tinged with ferruginous within), broad band at apex of first segment of abdomen, sharply emarginate and bordered with ferruginous anteriorly, interrupted band at apex of second segment, small spot on each side of third segment and line on each side of second ventral segment, all pale yellow. Legs dull yellow, paler anteriorly and on tarsi, the four anterior coxæ above and the posterior pair except at apex, and a stripe on the four posterior femora above, piceous-black; pulvillus and tips of tarsal claws fuscous. Antennæ, tubercles, tegulæ and line above honey-yellow, basal joints of antennæ yellow beneath and fuscous above. Sides of the first abdominal segment and the apical margin beneath, spot at tip of fifth segment and the sixth entirely, ferruginous; narrow borders of all the abdominal segments testaceous. Wings brown with a purple reflection, darker about the marginal cell, costa and stigma testaceous. Antennæ slender, curved, apical joint slightly narrowed towards tip. Front broad, sparsely punctured; eyes narrow, slightly sinuate within; clypeus twice as broad as long, the suture nearly straight, disk swollen, margined and truncate anteriorly, the upper lateral angles reaching the eyes; labrum transverse, ciliate; mandibles with only one tooth near the apex; head broader than usual posteriorly and limited by a sharp circular carina. Four longitudinal grooves on mesothorax anteriorly; base of both the scutellum and postscutellum transversely depressed and the groove divided by longitudinal carinæ; enclosure of metathorax marked off by two similar depressions, the enclosure with a median groove extending to the apex and several irregular grooves or carinæ at base which do not extend much beyond the middle; sides of "propodeum" swollen and distinctly separated from the remainder of the thorax and from each other, striate and sparsely punctate towards the median line, elsewhere smooth and polished. Basal segment of the abdomen more slender than in *H. phaleratus* (Say), slightly swollen at the apex beneath; second ventral segment transversely depressed at the base, not produced; enclosure on sixth segment broad (much broader than in any other species known to me), rounded at tip, sparsely punctured and with a smooth margin. Second submarginal cell much narrowed towards the marginal, receiving both recurrents beyond the middle and near together; the third submarginal cell large; submarginal nervure reaching border of wing; submedial cell of posterior wings extending

upon the externo-medial nervure to the same distance as the medial cell.

Southington, Conn., July.

NYSSON AEQUALIS, n. sp.

♂. Length 8.5 mm. Black ; mandibles, scape, first joint of flagellum beneath and spot on second joint, testaceous ; tips of mandibles and spot on the scape above, piceous ; spot on scape beneath, uneven line on collar connected on each side with the tubercles and interrupted in the middle, the tubercles excepting a piceous dot, transverse spot on anterior portion of scutellum, the spines of metathorax, spots on anterior and posterior coxæ and at the tip of the four anterior femora beneath, and interrupted bands on the four basal segments of the abdomen, that on the fourth segment very narrow and that on the first segment broadest and none of the bands dilated at the sides, yellow ; legs fulvous, the coxæ and a spot on the femora within black. Body clothed with a very fine pubescence, that upon the face, the sides of the dorsal face of the metathorax and the margins of the abdominal segments longer and distinct, apex of the abdomen with a fringe of curved bristles. Wings brown ; third submarginal cell with a short side upon the marginal, submedial cell of posterior wings extending beyond the medial cell upon the externo-medial nervure. Body strongly punctured, the punctures somewhat confluent upon the pleura of mesothorax and upon the two apical segments of the abdomen and more sparse upon the other abdominal segments. A slight depression on each side of the disk of the mesothorax and an impressed median line extending upon the disk from the prothorax. Posterior portion of scutellum, the postscutellum and the base of metathorax longitudinally rugose, the rugæ slightly connected by transverse rugæ ; the postscutellum elevated into a transverse ridge ; sides of the metathorax coarsely reticulated, the reticulations radiating from the prominent spine ; posterior face of the metathorax divided into three areas, the lateral areas excavated and divided into coarse reticulations by transverse ridges, the median area flat and finely reticulated. Twelfth joint of the antennæ thickest ; the thirteenth joint almost equaling the scape in length, excavated beneath. Seventh segment of the abdomen terminating in an obtuse angle, its upper face having a sharp ridge on each side, the ridges terminating in stout spines.

Easthampton, Mass., July 24th.

The form of the apex of the abdomen will at once distinguish this from the species which it resembles.

NYSSON LATERALIS Pack.

Nysson laterale Pack., Proc. Ent. Soc. Phila., vi., 440, ♂.

♀. Differs from the ♂ in having an irregular line on the prothorax and a dot on each side of the fourth segment of the abdomen yellow. The yellow spots on the first segment of the abdomen are slightly emarginate anteriorly. The subterminal joint of the antennæ is not much lengthened beneath and the terminal joint is not distinctly pinched beneath. The abdomen is punctured with larger and smaller punctures, the larger punctures numerous and deep on the first segment.

Northern Illinois (E. J. Lake).

SPILOMENA PUSILLA.

Stigmus pusillus Say, Bost Jour., i., 378.

♀. Head and thorax not shining like the abdomen; wings beautifully iridescent; mandibles, basal joints of antennæ, the tegulæ and legs dull honey-yellow, tubercles black, the coxæ and femora more or less black; upper face of metathorax enclosed by two ridges which curve inwards to unite on the verge of the truncation, the enclosure transversely reticulated and divided into three areas by two longitudinal ridges; apical segment of the abdomen compressed and acuminate.

Waterbury, Conn., Aug. 8th. Taken on the leaves of a rose bush in company with *Passalococcus annulatus* (Say) and *Blepharipus minimus* Pack.

CRABRO BIGEMINUS, n. sp.

♀. Length 10 mm. Black; scape, first joint of flagellum beneath, mandibles except the piceous tip and lower border, interrupted line on collar, tubercles and square spot behind them, dot on tegulæ, two dots on each anterior angle of the scutellum, the postscutellum, spot on each side of metathorax, dot on posterior coxæ, tips of the femora, more broadly on the anterior and intermediate pairs, tibiae excepting a piceous line on the four anterior beneath, basal joints of the tarsi, fasciæ on all the segments of the abdomen except the last, the fasciæ on the first and fifth segments broadest, those on the three basal segments interrupted and the others narrowed in the middle, the fascia on the first segment broadest at the interruption, all yellow. Clypeus and sides of face silvery, the

middle of the clypeus with a faint golden tinge. Wings subhyaline, tegulae and nervures testaceous. Body very finely punctured, the punctures more sparse upon scutellum; sides of thorax delicately striate longitudinally; metathorax divided by a median impressed line, delicately striate, the longitudinal striae of the base curving to meet those of the sides, the striae of the posterior face transverse. Basal segment of the abdomen more coarsely punctured than the following segments. Enclosure on sixth segment flat and broad, coarsely punctured, the margin smooth.

♂. Length 10 mm. More slender, tubercles oscillated with black, spot behind them smaller, line on collar more widely interrupted, only one dot at the extreme lateral anterior angle of scutellum, no spot on metathorax, metathorax more coarsely striate, fascia on the third segment of abdomen entire, the fascia on fifth segment narrow and a similar fascia on sixth segment. Apical segment with a longitudinal impression. Antennae twelve-jointed, the third joint excavated at the base beneath, the fourth and fifth joints slightly excavated beneath; the sixth joint arcuated, much excavated beneath, thickened at the apex, the seventh joint obliquely attached and short like the following joints. The two basal joints of anterior tarsi white, a little dilated externally, the three apical joints black; first joint of intermediate tarsi short, much thickened beneath, especially towards the apex; second joint arcuated, produced at the apex beneath.

Waterbury, Conn., ♂ Aug. 23rd; ♀ Aug. 24th.

Allied to *C. dilectus* Cress., but in that species there is no yellow spot on the metathorax, the abdominal fasciae are broader, and in the ♂ the third joint of the anterior tarsus is white.

BLEPHARIPUS UNICUS, *n. sp.*

♀. Length 5 mm. Black; tips of the mandibles, the tegulae, spurs of posterior tibiae and extreme base of the first joint of posterior tarsi, the last joint of posterior tarsi, the tips of all the coxae and trochanters and the tips of the posterior femora and tibiae, piceous. Scape beneath, dot on first joint of flagellum, the tubercles, the four anterior tibiae excepting a black spot beneath, and the tips of the four anterior femora, yellow. The four anterior tarsi, excepting the fulvous apical joint, and the base of the posterior tibiae, whitish. Clypeus black, covered with a silvery pile; flagellum fulvous beneath. Thorax beneath and the abdomen with short scattered pubescence. The abdomen excepting the rufo-piceous

enclosure on the sixth segment entirely black. Wings hyaline, beautifully iridescent, the nervures and stigma black. Head, thorax and abdomen smooth. The head as wide as the thorax, and the vertex *longer than wide*, the front narrow. The ocelli arranged in an equilateral triangle, each in a separate depression; from the anterior ocellus an impressed line extends downwards upon the face and another extends backwards upon the vertex; on the inner orbit on the vertex is a slight groove curving at the end to come in a line with a short oblique groove behind each posterior ocellus. Prothorax sharply angulated beneath, mesopleura sharply angulated beneath near the coxae. Anterior portion of the mesonotum with four short lines which extend upon the collar as slight notches; mesonotum with a slight groove on each side of the disk and with a marginal row of reticulations over the tegulae. Scutellum quadrate, connected with the mesonotum by the broad lateral angles between which it is separated by a basal row of large reticulations. The semi-circular area on base of metathorax is encircled by a row of similar reticulations and divided by a deep median groove. Similar rows of reticulations extend in a slightly curved line down upon the mesopleura from the anterior wings and others mark the lateral sutures of the metathorax. The sides of the mesothorax beneath and the sides and posterior face of the metathorax are finely striate; these striae curve upon the metathorax above and are represented within the enclosure by striae of microscopic fineness. The posterior face of the metathorax has a deep triangular median depression above and is more coarsely rugose beneath. Area on the sixth segment of the abdomen not punctured, depressed medially, the sides much thickened and raised. Abdomen shorter than the rest of the body, narrow at base, broad near the tip. The posterior tibiae much thickened.

New Haven, Conn.; July 15th.

The elongate head and clavate abdomen give this species a very peculiar appearance.

AN ANOMALOUS BOMBYLID.

BY S. W. WILLISTON, NEW HAVEN, CONN.

I have recently received from North Park, Colorado, two interesting specimens of *Anthrax*, one of which is remarkable for its neuration. They are of a new species of the *A. halcyon* group, and both apparently

females. In one specimen there are cross-veins connecting the upper branch of the third longitudinal with the second, thus forming three distinct submarginal cells as in *Exoprosopa*. In the other specimen they are entirely wanting, nor are there any rudiments. Again, in the first the second submarginal cell in the wing is intersected by a cross-vein running into the margin, and also a stump in the first submarginal before the furcation. In the other specimen they are entirely wanting.

Here we have two specimens which can not possibly be separated, of which one might be referred to *Exoprosopa* of the *fascipennis* group, and the other to *Anthrax*! I have also another undescribed species of this group from the West, with a stump of a cross-vein nearly dividing the first submarginal, and the third posterior cell bisected as in *halcyon*. These veins are evidently all spurious, but one can readily understand how natural selection has caused such to become persistent, thus constituting not only new species, but, as we understand them, new genera.

I append a description of the former species, that attention may be called to it.

Anthrax, sp. nov., near *fuliginosa* Lw.

Face yellow with yellow pile, black on the oral margin in front; front and two joints of the antennæ of the same color (the third wanting); the former with black hairs above, and the latter with black pile. Proboscis black. Thorax black with fulvous pile above, evidently; pleuræ with whitish hairs. Scutellum reddish, black at base. Ground color of abdomen black; second, third and fourth segments with large oval reddish spots on the sides; fifth and sixth reddish on the sides, seventh wholly so. Tomentum reddish. Sides of segments with black and white hairs. Venter yellow. Legs luteous, tips of anterior tibiæ and all the tarsi infuscated. Wings brown with the following hyaline spots: End of first submarginal and nearly all of second submarginal cells; the latter part of the intervening vein strongly clouded, as are all the others except between the discal and third posterior cells; second, third and fourth posterior cells; the larger part of the discal cell; and opposite it the inner part of the third posterior with a second spot. Also dimmer spots in the second basal cell and anal angle. Third posterior with a stump of a vein. Length 10 mm. From G. B. Grinnell.

DESCRIPTION OF PREPARATORY STAGES OF ARGYNNIS
IDALIA, DRURY.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG—Shaped like that of *Diana* and *Cybele*; conoidal, truncated, rounded at base, the sides well rounded; depressed at summit; marked vertically by about 18 vertical ribs, somewhat wavy, half extending from base to summit, the remainder ending irregularly at about three-fourths the distance from the base; between each pair of ribs are equi-distant, transverse, slightly raised striæ. Duration of this stage about 25 days.

YOUNG LARVA—Length .08 inch; cylindrical, somewhat thickest in middle; color pale yellow-brown, translucent; each segment from 3 to 12 marked by a transverse row of eight elongated, sub-ovate, tubercular dark spots, of which six lie on dorsum and upper part of side, and one below spiracle, the whole forming eight longitudinal rows; from each spot spring one or two long black curved hairs; head scarcely broader than 2nd segment, rounded in front, bilobed, the vertices rounded, sparsely pilose. The larvæ at this stage cannot be distinguished from *Diana*, *Cybele* or *Aphrodite*. The 1st moult occurred 23 days after the close of hibernation.

After 1st Moult—Length .15 inch, cylindrical, stout, tapering from middle either way; color cinereous, mottled and striped with brown; a macular stripe running with the dorsal rows of spines, and another just outside 1st laterals; the spines form six longitudinal rows, two dorsal and two on either side, and are long, fleshy, black, each beset with short black hairs; head black. Duration of this stage 12 days.

After 2nd Moult—Length .3 inch; stouter; mottled and striped with light and dark cinereous; the spines longer, more tapering, each dull yellow at base; head black. Duration of this stage 15 days.

After 3rd Moult—Length .7 inch; same shape; the dark portions quite black, the light of a dirty white; on dorsum a white stripe through which runs a black line; at the junction of the several segments a transverse white stripe, on which are short black lines; each segment crossed longitudinally by black stripes, interrupted by the spines, with a wedge-shaped mark between the spines; these are long, shining black, with black bristles, and mostly rise from pale orange tubercles; head flattened frontally, bilobed, the vertices rounded; color light brown. To next moult 17 days.

After 4th Molt—Length 1 inch ; stouter, more tapering either way ; the ground color buff ; a broad buff band covers the middle of dorsum, enclosing a macular black line ; markings nearly as before ; the tubercles and base of spines mostly orange. To next moult 20 days.

After 5th Molt—Length 1.2 inch ; 15 days after the moult the larva reached maturity.

MATURE LARVA—Length 1.75 inch ; cylindrical, obese, tapering from middle to either end ; furnished with six rows of tapering, fleshy spines, mostly somewhat recurved ; those of the two dorsal rows, on segments 6 to 10, largest ; the two dorsal spines on segment 2 shorter, about equal to those on 13, and directed forward ; all these silvery-white with black tips ; the spines of the lateral rows smaller, yellowish, those of the lower row orange at base and half way to top ; of the upper lateral row part are orange and at base only ; from each spine proceed several short, straight, fine black bristles ; color of body velvet-black, banded and striped with ochrey-yellow, changing to dull orange or red ; on middle of dorsum a broad band enclosing a macular black line, sometimes obsolete ; at the base of body a darker band ; at the junction of each pair of segments three narrow transverse stripes ending at the lower band ; each of the oblong black spaces on either side of dorsum crossed by short yellow stripes ; the last segment wholly yellow ; spiracles oval, black in white rings ; under side olive-brown ; legs black, pro-legs smoky-brown ; head rather small, rounded, flattened frontally, bilobed, the vertices rounded ; somewhat pilose ; color reddish-ferruginous on upper half, black below. Twenty hours after suspension made chrysalis.

CHRYSALIS—Length 1.1 inch ; general shape as in the allied species ; much compressed laterally, the wing cases very prominent and flaring at the base on ventral side ; head case nearly square at top, compressed and excavated on the sides, with two small ocellar prominences ; mesonotum rounded, a little carinated, followed by a deep rounded excavation ; abdomen tuberculated, the two dorsal rows extending to mesonotum ; color brown and yellow over abdomen ; the mesonotum pinkish-brown ; the wing cases brown and more decidedly tinted pink ; each dorsal tubercle shows a large dark patch on the anterior side ; similar patches on the wing cases ; the tubercles on mesonotum black, and each is joined by a black band to a patch back of and near the base ; about the head case several irregular dark or black spots ; on the wings a brown

patch at base, one on middle of disk and six elongated spots in row within the margin. Duration of this stage 17 days.

I have received eggs of *Idalia* in different seasons from Mr. G. M. Dodge, Nebraska, laid from middle to last of September, of females confined in bags over plants of violet. The larvæ hatched in from 23 to 25 days, and after eating the egg shells, went at once into lethargy, most of them taking refuge at the base of the leaf stalks on the violet on which I placed them. Some fixed themselves on the under side of the leaves. Their behavior is similar in all respects to that of *Diana*, *Cybele*, etc., passing five moults, and in the northern area of the species the butterflies emerge from chrysalis in July. At Martha's Vineyard I found them emerging 25th July and subsequent days. In the neighborhood of Philadelphia, I have been told by Mr. T. R. Peale that *Idalia* is double-brooded, there being one generation about 1st July, another about 1st September. He had found several caterpillars in New Jersey in the early part of June, one of which suspended the day after it was taken, and three days later made chrysalis. At the north there is but a single brood. Mr. Scudder has informed me that at Nantucket he observed a female *Idalia* laying eggs on *Sericocarpus conyzoides*, a species of white Aster, and the same would happen at Martha's Vineyard. But the larvæ eat violet readily in confinement.

Idalia is common in many localities, but rare in others, in the belt which it inhabits, and this belt extends from Massachusetts westward to Nebraska. I have never seen the species in West Virginia, but not unlikely it is found in Virginia and Maryland along the coast. It seems very subject to suffusion, and many examples are to be found in different collections in this country. One of the most striking of these was named *Ashtaroth* by Mr. Fisher, who took it, and it was figured in the Proc. Acad. Nat. Sci. Phil., 1852. I saw this beautiful example afterwards in the collection of Mr. Reakirt, borrowed from the Academy's collection, to which it has not yet been returned.

DONATIONS TO THE COLLECTION OF THE ENT. SOC. OF ONT.—We beg to acknowledge with many thanks the following donations to the collection of our Society: From J. A. Moffat, of Hamilton, Ont., one pair of *Arzama diffusa*, and from G. H. French, Carbondale, Illinois, one specimen of *Arctia rectilinea*.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY
OF ONTARIO.

The ninth annual meeting of the Entomological Society of Ontario was held in Ottawa, in the Museum of the Ottawa Literary and Scientific Society, on Thursday, the 25th of September, at 4.30 p. m. In addition to the members of the Society, there were present on invitation about twenty members of the Ottawa Field Naturalists' Club.

In the absence of the Secretary-Treasurer, Mr. Jas. Fletcher was appointed Secretary *pro. tem.*

The President read a telegram which he had received from the Vice-President, regretting that important engagements prevented him from being present.

The annual statement of the Secretary-Treasurer was read and adopted. The report of the Council was read and adopted.

Mr. Couper then read the report of the Montreal Branch, indicating very satisfactory progress ; this was referred for publication.

The annual address of the President was next in order, after the reading of which a vote of thanks was tendered to him both in the name of the Society and also in that of the Ottawa Field Naturalists' Club for his exceedingly interesting and instructive address, and a copy was requested for publication in the Annual Report.

The election of officers then took place, resulting in the appointment of the following gentlemen :

President, W. Saunders, London ; Vice-President, Jas. Fletcher, Ottawa ; Secretary-Treasurer, Jas. H. Bowman, London ; Council—Rev. C. J. S. Bethune, M. A., Port Hope ; Wm. Couper, Montreal ; J. M. Denton and E. B. Reed, London ; R. V. Rogers, Kingston ; G. J. Bowles, Montreal, and W. Harrington, Ottawa. Editor of ENTOMOLOGIST, W. Saunders, London. Editing Committee—Jas. Fletcher, G. J. Bowles and E. B. Reed. Librarian, W. E. Saunders. Library Committee—E. B. Reed, J. M. Denton, H. B. Bock, with the President, Librarian and Secretary. Auditors—Chas. Chapman and A. Puddicombe, London.

A short time was agreeably spent in asking and replying to queries in reference to insects and their habits, and in examining the collections of insects in the Museum, after which the meeting adjourned.

JAS. FLETCHER,
Secretary *pro. tem.*

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EDITED BY

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LONDON, ONTARIO



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The Canadian Entomologist.

VOL. XI.

LONDON, ONT., DECEMBER, 1879.

No. 12

ENTOMOLOGY FOR BEGINNERS.

BY THE EDITOR.

It is intended that in the forthcoming volume of the CANADIAN ENTOMOLOGIST each number shall contain at least one paper addressed especially to beginners in Entomology. Our esteemed coadjutor, Mr. Jas. Fletcher, of Ottawa, has kindly offered to assist in this undertaking, and we hope that other able hands will render all the aid they can. We want in this way and by the aid of illustrations to make the ENTOMOLOGIST more interesting to the general public and especially to the young, as well as to agriculturists, and we trust that this can in some measure be accomplished without interfering with its value as a scientific journal and a medium of communication among advanced Entomologists. It is to the young that we must mainly look for recruits to fill the vacancies which time will make in the Entomological ranks, and if by any means we can induce some of our young friends to devote their leisure hours to Entomological studies

we shall be abundantly rewarded for our efforts, for the taste once acquired will seldom wane or die. We do not propose at present to follow any systematic course, but to treat in a series of brief articles of the habits and life history, as far as they are known, of such insects as are frequently met with, no matter what Order they may belong to. We hope also to be able to present occasional papers containing hints and instructions in reference to collecting and preserving insects.

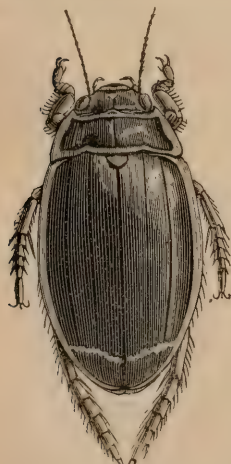


Fig. 13.

Dytiscus Harrisii (fig. 13). This is one of the carnivorous water beetles, known as "Diving Beetles" or "Water Tigers," a strong, sturdy creature of an oval flattened form, with oar-like swimming legs, covered with long hairs. It is very active in the water, darting and diving about in different directions with great rapidity, the form of its body with sharp sides enabling it to cut

through the water with great ease. They may well be called the sharks of the insect world, for there are few things that live in the water which are safe from their attacks. They are especial enemies of the larvæ of other aquatic insects; they feed also upon tadpoles, molluscs and small fish, and when pressed by hunger they do not hesitate to devour one another. They may be kept in an aquarium and fed on water insects and small pieces of raw meat, which they suck greedily.

Fig. 13 represents this species very correctly; it is black with a broad margin of pale yellow on each side, and stripes of the same color across the front of the head and on both the front and hind margins of the thorax; there is also an irregular yellow line crossing the wing covers near the tip. The under side is somewhat paler with reddish markings. Examples of this insect are often brought to us during the summer by persons who have found them in tubs or barrels of water and who were puzzled to know how they could get there. Beneath their hard wing covers they have a large pair of membranous wings, by the use of which they can fly with great ease; by this means they are enabled to travel from pond to pond in search of their prey. When wishing to change their location they crawl out of the water (usually towards evening) either up some reed or other water plant, or to the margin of the pond, and suddenly open their wing covers, expand their wings and rise into the air almost perpendicularly to a great height. Their descent is nearly as sudden and direct, and they often, when descending, drop into the water with considerable force. It would appear that they are enabled to distinguish the water from a considerable height by its glassy surface, for sometimes they have been known to drop with violence upon glazed garden sash, which they had evidently mistaken for water.

The female lays her eggs in the water, where they soon hatch into young larvæ, possessing the ferocious disposition and voracious appetite of their parents. The larvæ grow rapidly, and when mature are about two inches long, with large flattened heads armed with sickle-like jaws, with which they seize other insects and hold them while they suck their juices; they sometimes quickly snip off the tails of young tadpoles, and are known to attack young fishes and suck their blood. Many years ago, when searching with a dip-net in a pond for the larvæ of Dragon-flies, we caught one of these savage creatures, and supposing it could be as safely handled as the libellulæ larvæ, took hold of it, when it quickly turned and buried its sharp jaws in the flesh of one of our fingers, making the blood flow

quite freely. These larvæ breathe through their tails, which they protrude into the air for that purpose. When full grown and about to assume the pupa state, the larva leaves the water, and burying itself in the earth, constructs there a round cell within which it undergoes its change, and if this occurs in summer, it appears in two or three weeks as a perfect beetle; but if in autumn it remains in the chrysalis state all winter, transforming to a beetle in the spring.

Fig. 14 represents another of our large water beetles, *Hydrophilus triangularis*. This species is entirely black, and so strong and muscular as to be difficult to hold in the hand when captured. The relationship of this tribe of insects (*Hydrophilus*) with the preceding one (*Dytiscus*) is very close. There is much similarity of form and a close resemblance in habits; their method of swimming, however, is different, for while in *Dytiscus* both paddles are moved simultaneously, in *Hydrophilus* they are moved alternately, hence the stroke of the latter is much less effective. We are not aware that anything has been written on the early stages of *Hydrophilus triangularis*, but in Europe the life history of a closely allied species, *Hydrophilus piccus*, has been carefully traced by several observers, and there is little doubt but that our species has similar, if not identical habits. The female of *H. piccus* has the singular habit of spinning a silky cocoon for her eggs, one side of which is furnished with an upright, bent, horny point, an inch long, which is supposed to be serviceable in conveying air to the interior. These eggs, some fifty or sixty in number, are placed in an upright position and in regular order in their receptacle, which is round and flattened and attached to some water plant at the surface of the water. In warm weather the larvæ are hatched in from twelve to fifteen days, when they escape at the lower part of the cocoon, which is closed only by a few threads. They undergo three moultings, and when full grown measure nearly three inches in length. The head is horny and of a very singular form, its lower surface being convex, while its upper surface is flattened. Its sharp and formidable jaws are well adapted for seizing and securing its prey. They are said to attain their full growth in July, when they leave the water, bury themselves in the earth, where they undergo their changes in a manner similar to that of *Dytiscus*.



Fig. 14.

ON THE LARVAL HABITS OF LIMENITIS ARTHEMIS (WITH
ITS CO-FORM PROSERPINA), AND ALSO OF
L. DISIPPUS.

[From Advance Sheets of Part VIII., Vol. 2, of Butterflies of North America.]

BY W. H. EDWARDS, COALBURGH, W. VA.

The larvæ of *Arthemis* feed on the leaves of willow, aspen, basswood, and, it is said, on thorn. In the Catskills, the eggs are laid the last days of July or early in August, on young trees, and but one egg upon one leaf. This is placed near the tip, and the newly hatched larva eats away the leaf on both sides of the midrib. When at rest, it is to be found on the stripped portion of the rib, and is easily discovered by this habit. When two larvæ are hatched on one leaf, as happens when two eggs have been laid in confinement, Mr. Mead has noticed that one of them occupies the midrib, while the other rests on a perch constructed by itself from the side of the leaf. This perch, he says, is nearly a quarter of an inch long and about one fiftieth of an inch in diameter, irregularly cylindrical and composed of frass and small bits of the leaf, fastened together and covered with grayish silk.

Limenitis Disippus has in all respects larval habits similar to *Arthemis*, and as I have often watched the construction of the perch in that species, one account will apply to both. The end of the rib is no sooner laid bare than it is coated and wound with silk, and to the extremity are fixed grains of larval excrement, at first but two or three, placed one after the other in line. These are bound together and to the rib, and being small as grains of rifle powder, they form a continuation of about the same dimensions as the rest of the perch, and seem effectual to prevent curling as the rib dries. As the larva grows, the process is continued until this artificial portion will measure five or six tenths of an inch, and makes a stout, irregular cylinder, the entire perch reaching about one and a half inches. It is constantly strengthened by additions of silk, the larva almost invariably, as it goes back and forth from its feeding ground, adding threads and patching the weak places. On the perch the larva, in its younger stages, that is, before hybernation, always rests, going to the leaf for food at short intervals. It occupies the middle of the perch and its usual attitude is a twist, the ventral legs clasping; but the anterior half of the body is bent down by the side of and somewhat under the perch. If

two larvæ are placed on the same leaf, one always takes possession of the extremity, often with something of a contest and knocking of heads together; but the other will presently be found on one edge, excavating on either side of a narrow strip which is to constitute the base of the perch. This is bound and lengthened with frass and serves every purpose.

Both these species of larvæ have a habit of accumulating little scraps of leaf at the base and under side of the perch till quite a packet is formed, and this is rolled back as the substance of the leaf is eaten so as to be close to the cut edge of the leaf. This edge, in willow, is kept nearly square, a section being eaten from one lobe and then a corresponding one from the other. In beginning on a fresh section, the larva lies diagonally across one corner, the anal legs clasping the base of the perch, and its head will strike the side of the leaf about two tenths inch above the corner. It eats a canal nearly perpendicular to the side and towards the midrib; not all at once, by any means, for this is the result of several meals, in the intervals always returning to the perch. When the rib is reached, the larva then begins to feed on the lower side of the canal next the rib, and to keep the slender and unsteady bit of leaf in position it spins guys from the end and edge to the solid leaf opposite and to the rib. As the feeding proceeds and a considerable triangle is held only by a narrow strip, which diminishes at each mouthful, more guys are put out, and, at last, when the triangle falls, it is held by the threads and swings to the base of the perch. If not, it is soon brought there by fixing one thread after another from it to the rib and leaf till it is pulled to its place. Here it is bound loosely. As other bits are added, there comes to be an open packet, held together by simple threads, and of about one tenth inch diameter. In the two younger stages this is moved along as the larva feeds, and is always kept close to the leaf, partly by pushing, what is gained at each effort being secured by threads, or it is rolled by attaching successive threads from the farther side to the leaf and rib till the mass is turned over. After the second stage the packet is left behind, and no additions are made to it. I was at first puzzled to account for this construction; but happening to see one of the caterpillars back down the perch and drop its excrement directly into the packet, it occurred to me that really this was the magazine whence the larva drew its materials for lengthening the perch. On pulling some of the packets apart a few grains were always found in them. This I believe to be the use of the packets, and without some contrivance to catch the frass, it is difficult to see how

the larva obtains the materials it uses. Apparently it drops just about enough into the packet for the object in view, for it is certain that the grains are usually expelled wherever the larva happens to be, and fall to the ground. After the end of the perch is sufficiently strengthened and there is no further need of the grains, the packet is dropped behind and neglected.

The larvæ of *Arthemis* hatch in from seven to nine days, undergo two moults, and construct, each for itself, cases or hybernacula of leaves in which to pass the winter. As the weather in spring becomes settled and warm, they emerge from their cases, feed a few days sparingly, and pass the third moult, soon to be followed by the fourth and last, and must change to chrysalids from 1st to 15th June.

The larvæ of *Disippus*, however, mostly pass three moults before they make their cases (at Coalburgh, W. Va., though perhaps but two towards the northern limit of the species), and two moults in the spring. But occasionally a larva is found constructing its case and taking possession after the second moult. Whether these individuals pass more than two moults in the spring, I am not yet able to say. Both species cut out the patterns of the cases as follows: First eating a narrow canal for one quarter inch, the width of the head, obliquely outward from the stem at base; next a canal of same length on the side of the leaf, about three fifths the distance to the apex, perpendicular to the edge; then turning this at a right angle in the direction of the first canal and cutting for a little distance; then crossing to the other half of the leaf and cutting similar canals; after which the extremity of the leaf was cut off by an incision from the bend in the second canal directed obliquely forward to the midrib, first on one side, then on the other; next the first and second canals on one side were joined, then on the other side, and there remained of the leaf but a small fiddle-shaped piece, lying almost equally on either side the rib. Before and during the time this work was progressing, the larva had taken intervals of rest from the cutting, and had occupied itself in weaving threads from the branch to the stem, and along the upper side of the leaf, thus coating with silk what was to be the inside of the case. Finally, beginning at the base, it drew the edges partly together for a little distance, leaving an open space between of about one tenth inch, and held them in position by single threads; then proceeded to weave a thick permanent covering to this gap; which done, it worked back, drawing the edges as before, and weaving, till at length the case was complete. As it

spun, the larva was in a constant state of anxiety about its work, as if it foresaw the storms of rain and wind it must be subjected to for many long months, shut in this slender house. In closing, it lies along the midrib inside, its anterior segments extending over the top, and it moves its head from side to side weaving a concave edge. But it often reached far over and added a thread here and there where the work seemed to be finished, and it would frequently leave the case to inspect the fastenings about the branch, and to weave additional threads there as needed. The silk is passed entirely around the branch, and binds both sides of the leaf-stem. In weaving at the case the larva would soon become exhausted. I timed one actively at work for ten minutes, and there succeeded an interval about as long of rest, the larva lying motionless along the midrib. When at last the case is finished, the larva enters and rests awhile, but presently comes out, runs about examining the stem and the fastenings, then returns—and this scrutiny will be repeated perhaps three or four times. Two larvæ were kept in the same glass, each of which had commenced a case and partly inclosed it, when I removed one. The other soon began to amuse itself by shifting about, trying each case and working at it, and finally completed and occupied that which it had not begun. Some days after all had apparently retired for the season, one came out and wandered uneasily about, but a few hours later was found to have returned to its case and was seen no more.

There was some variation in the mode of cutting the pattern, as sometimes work was begun on the side of the leaf instead of at the base. But it always resulted in the same fiddle-shaped piece. The cutting was evidently fatiguing, from the inconvenient position of body required, the head and anterior segments having to be bent sideways, even to a right angle much of the time, and the larva frequently rested and shifted its place. It was never found on the wrong side of the cut, however, or in danger of falling with the rejected portion of the leaf. Occasionally after having begun a case the larva would desert it and construct another. The larvæ finally entered the cases head first, their bodies contracting in length and proportionately thickening so as to completely fill the upper end of the tube, and allow nothing to be visible from the aperture, while over this last the long flap of the leaf soon curved sufficiently to keep out water.

Probably in the natural state the case of *Arthemis* is constructed from the leaf on which the caterpillar began its existence, whether willow or aspen.

This is so with *Disippus*. The ends of the leaves have been eaten away and only the sides need shaping. But if the residue is insufficient, or for any reason does not answer the purpose, the caterpillar moves to another leaf and begins cutting.

ON A NEW PSOCUS.

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

In my investigations of the insects of the Orange tree, I have discovered another curious insect on some branches infested with Scale Insects, and given me by Major A. J. Russell. I at first took them to be Aphides, but on closer examination they proved to belong to *Psocus*.

The eggs are laid in oval masses under and frequently on upper part of leaf, and are protected by a closely woven web, through which are sprinkled sooty particles. The young, when first hatched, are very active, white, Aphis-like looking creatures, from a dozen to twenty clustered together, in all stages of development, beneath the web. On disturbing they disperse from under it with surprising rapidity. They probably prey upon the young Scale Insects and the decaying matter caused by them. As I can find no description or mention of them, I submit the following :

Psocus citricola, n. sp.

Elongate, pale yellowish ; head large, as wide as long, outer edge from eye to eye forming a perfect half circle ; eyes are large and very prominent ; maxillary palpi four jointed, the basal joint little longer than either of the others, but narrower ; the others about even in length but gradually increasing in thickness, the last being the thickest ; antennæ three-jointed, first two short, same size, as wide as long ; the last joint is long and filiform, reaching nearly to the end of abdomen, and covered with long fine hair ; thorax narrower than head, slightly longer than wide, rounded at edges, with a transverse suture dividing it into two parts (immature specimen) ; abdomen longer than head and thorax together, eight segments, the largest being nearly twice as wide as thorax ; legs six, rather long, tarsi two-jointed, ending in two minute claws. The abdomen and

legs have small short hairs springing out all over them. Wings hyaline, with costal, subcostal, median and submedian veins; in fore wings the subcostal runs parallel with costal until before reaching apex it bends downwards and then curves upwards, ending at termination of costal vein, forming a cell which is opaque; it also sends a veinlet from before middle that descends and curves around upwards until near the third of the wing, when it divides, the lower ending in outer edge; the other runs to below apex, near the edge, where it divides into two short veinlets, terminating at outer edge; median vein curves slightly downwards until near the middle of wing; it then divides into two, the lower descending till near apex of inner edge, when it suddenly curves upwards, terminating at outer edge, the cell thus formed being opaque; the other veinlet ascends, crossing the branch of the subcostal till just before reaching the apex it breaks into two veinlets, forming a small triangular cell at apex. Hind wings contain one costal, three subcostal, two submedian, and one internal cell. Length of matured specimens from .10 to .12 of an inch.

MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The sixth annual general meeting of the Montreal Branch of the Entomological Society of Ontario was held at the residence of G. J. Bowles, Esq., on Tuesday, the 3rd June, 1879, at 8 o'clock p. m.

Mr. Bowles read a paper entitled "Some of the insects that frequent the orchard and garden—under what circumstances they increase unduly, what insects to spare, what to kill, and how to kill them, with other useful information," by the Rev. F. W. Fyles, corresponding member of the Nat. Hist. Soc.

The annual report of the Secretary-Treasurer was then read and adopted. This report showed that after meeting the current expenses of the year, there still remained a very fair balance on hand.

The proceedings were closed by the election of the following officers for the ensuing year:—President, G. J. Bowles; Vice-President, H. H.

Lyman ; Secretary and Treasurer, Geo. H. Bowles ; Curator, F. B. Caulfield ; Council—Robert Jack, W. Couper and G. B. Pearson.

The meeting then adjourned.

G. H. BOWLES, Sec'y.

Annual Report of the Council of the Montreal Branch of the Entomological Society of Ontario.

In presenting their sixth annual report, your Council have much pleasure in stating that the Society is still making satisfactory progress.

Eight very pleasant meetings have been held during the year, and besides the many interesting Entomological items recorded in the minutes of the Society, the following papers have been read before the members :

1. On the larvæ of *Papilio brevicauda* and *Pieris borealis*, and their food plants—W. Couper.

2. On the May Beetle, *Lachnosterna quercina*, and its parasites—G. J. Bowles.

3. Introductory notes on the Ichneumonidæ—G. J. Bowles.

4. Notes on *Phyciodes Harrisii* and *nycteis*—H. H. Lyman.

5. On the Saw-flies—G. J. Bowles.

6. My Entomological Trip to the Godbout River, 1878—W. Couper.

7. On the insects of the Mammoth Cave (selected)—Geo. H. Bowles.

The following books have been added to the Library :

Riley's Reports; 2, 4 and 5, making the set complete. The nine reports have been bound in three volumes, and form a very valuable addition to our Library.

Hentz's Spiders of the United States, with 21 plates.

Saussure's Solitary Wasps of America, with 4 plates.

La Crysomèle des Patates, from the Department of Agriculture, with 1 plate.

Report of the Entomological Society of Ontario, 1878.

Reports of the Fruit Growers' Association of Montreal, 1877 and '78.

Our order for books to the Naturalists' Agency is still not quite filled, and a balance of about \$10 remains in their hands.

Your Council would note that additions are still being made to the list of species in the "Montreal Catalogue," and would recommend the work to the members as one worthy of zealous prosecution.

In regard to the labors of the coming season, your Council feel glad

to report that the members are beginning their collections with renewed vigor; and they trust that the next year's operations will show a great advance in the study of our fascinating science in Montreal.

The whole respectfully submitted.

GEO. JNO. BOWLES, President.

Montreal, 3rd June, 1879.

THE SPECIES OF EROTYLA, SPRAGUEIA, FRUVA, XANTHOPTERA, EXYRA AND PROTHYMIA.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

EROTYLA SULPHURALIS Linn.

The neurulation of this European species is as follows: Fore wings 12-veined, 8 out of 7 well beyond the extremity of the accessory cell, 9 out of 8, a comparatively short furcation to costa. Hind wings 8-veined, 5 weaker than the rest, joined to the weak cross-vein which closes the cell; this latter is comparatively shorter than in *Spragueia*, veins 3 and 4 longer.

SPRAGUEIA LEO Guen.=onagrus H.-S. (nec Guen.) fig. 209.

Fore wings 12-veined, 8 and 7 together from the extremity of the accessory cell, 9 out of 8, a long furcation to costa. Hind wings 7-veined.

This North American species is the type of the genus *Spragueia*. I collected *leo* in Alabama. The fore wings have the costa striped with sulphur yellow to apical fourth, the costa beyond is orange to apices and there is an orange terminal band. A sulphur yellow stripe runs from base outwardly along sub-median interspace. The rest of the wing is blackish plumbeous, the central dark portion divided into three spots by two transverse orange lines which intersect the narrower dark space along internal margin as well. Fringes blackish except at anal angle, where they are orange. Three dark costal marks, the first two surmounting the two transverse orange lines, the outer of which latter tends to be broken and angulate on the median vein.

There can be no doubt that Herrich-Schaeffer's figure does not represent *onagrus* as illustrated and described by Gueneé. This confusion led me formerly to regard *leo* and *onagrus* as varieties of one species, but from my present material I must consider that we have two distinct species. Whether one of these is the *leo* of Gueneé admits of some doubt from his description. But if the species is but slightly variable in the continuation of the two orange lines which break up the mesial blackish stripe, his description will apply. In Herrich-Schaeffer's figure these two lines are, in effect, not continued across the wing, but joined in a sort of horse-shoe mark on internal margin; but the upper part of the horse-shoe is in reality the continuation of the basal submedian stripe, above which the lines are discontinued. If the outer orange median line alone be continued, then we would have Gueneé's spot "tresgrande, en Y plein," which consists of the bent subterminal band joined to the spherical reniform. While I have not before me the exact counterpart of Gueneé's description or Herrich-Schaeffer's figure, I believe it more reasonable that *leo* should vary to include both, than that I should suspect a third species in my material. That Herrich-Schaeffer's figure represents an easily understandable variety of my species I have no doubt.

SPRAGUEIA ONAGRUS, Guen., 2, 205, Pl. 10, fig. 2.

Fore wings 12-veined, 8 out of 7 a little beyond the extremity of the accessory cell, 9 out of 8, a long furcation to costa. Hind wings 7-veined, cell closed by a weak cross-vein.

Collected by Mr. Schwarz in Florida. In the character of the fringe of primaries it agrees with *leo*. It differs by the fusion of veins 8 and 7 at base, in which it stands nearest of all the species to *Erotyla*, but the hind wings are 7-veined and on primaries vein 9 is longer, as in the other species of the genus. The fore wings are sulphur-yellow at base with a rather broad plumbeous basal streak, a curved line below it above internal margin, which with the rest of the wing is orange, except the sulphur-yellow costal region. The discal spots are distinct, surmounted by three detached costal marks which note the inception of the anterior line, median shade and posterior line. A broad bent dark band on subterminal space, not continued to costa. A pre-apical costal mark. The first two of the four costal marks nearly fuse with the orbicular. In fresh specimens the colors are very vivid. In colors and ornamentation the species resembles *leo*. It is distinguished by the absence of the two orange

lines and of the median blackish longitudinal shade, as well as by the isolation of the spherical discal spots.

SPRAGUEIA PLUMBIFIMBRIATA Grote.

Fore wings 12-veined, 8 and 7 together out of the extremity of the accessory cell, 9 out of 8, a long furcation to costa. Hind wings 7-veined. The neuration agrees with *leo*.

This species, collected by Belfrage in Texas, has the fringes of primaries plumbeous; at internal margin a few pale hairs are sometimes to be noticed, but there is no distinct patch as in *leo* and *onagrus*. In color this species wants the orange of its allies, in ornamentation it resembles *dama*, but there is no basal plumbeous marking.

SPRAGUEIA DAMA Guen.

Fore wings 12-veined, 8 and 7 together out of the extremity of the accessory cell, 9 out of 8, a long furcation to costa. Hind wings 7-veined. The neuration agrees with *onagrus*, except that vein 9 is thrown off a very little further from the origin of 8.

I collected this species in Alabama. The fringe of primaries is entirely orange, flecked with plumbeous opposite the cell, and there are a few plumbeous hairs at internal angle.

I have a specimen of Guenee's variety "A" collected by Belfrage in Texas, July 30.

SPRAGUEIA TORTRICINA Zeller.

Fore wings 12-veined, 8 and 7 together from extremity of accessory cell, 9 out of 8, a long furcation. Hind wings 7-veined.

The species is bright yellow and has narrower wings than *Xanthoptera nigrofimbria*; the fringes are blackish and there are two cellular dots, the outer surmounting a blackish abbreviated band resting on internal margin two-thirds from base. The primary wings are a little more produced apically than in the other species, but the neuration agrees and the structure of the front differs from *Fruva*, to which genus I have referred it, CAN. ENT., ix., 69. It has been taken by Belfrage in Texas, May 10.

The clypeus is narrow and smooth in the species of *Spragueia*, flat on the first four species or but slightly bulging; in *tortricina* and *guttata*, especially in the latter, it is somewhat globose. In *Erotyla* the front is much projected and the surface is rough, the infra-clypeal plate is promin-

ent and the front terminates in a wide-lipped protuberance, centrally flattened, its lower edge exerted. In *Fruva fasciatella* the infra-clypeal plate is also prominent, the front is elevated and is crowned by a shallow, wider and more narrowly edged and rounded depression. Structurally *Fruva* is more closely allied to *Erotyla* than *Spragueia*, as we shall see in discussing the neururation of *F. obsoleta*, yet in ornamentation the resemblances are reversed.

SPRAGUEIA GUTTATA Grote.

Fore wings 12-veined, 8 and 7 together from the extremity of the accessory cell, 9 out of 8, a long furcation to costa, the accessory cell smaller than in the other species. Hind wings 7-veined.

This species has very distinct ornamentation, the fore wings being light sulphur yellow crossed by black lines; the only orange is at base on internal margin, and a band running upwards on median space within the t. p. line, interrupted by the black-ringed, sulphur-yellow, spherical reniform, and extending beyond it to apices. The fringes are orange, touched with blackish at apices, opposite the cell, and again about internal angle. It has been collected by Heiligbrodt in Bastrop Co., Texas.

The wings are narrower in *Spragueia*. The neurational characters which distinguish the North American genus from the European *Erotyla* (*Agriphila*) are first the 7-veined secondaries, with the three-branched median vein wanting the weak vein 5, while the cell is longer. Then the longer vein 9 of the primaries, while in all the species except *onagrus*, veins 7 and 8 spring together from the extremity of the accessory cell; in *onagrus* they are joined on a shorter stem than in *Erotyla sulphuralis*.

FRUVA FASCIATELLA Grote.

Fore wings 12-veined, veins 8 and 7 out of the extremity of the accessory cell, 9 a long furcation. Hind wings with vein 5 obsolete. The genus differs from *Spragueia* in the bulging clypeus surmounted by a shallow cup-like depression. But there is a faint indication of an independent vein on hind wings at the cross-vein, immediately beyond which it vanishes.

This species varies in the color of the indefinite shadings of the primaries from dusky olivaceous to ochreous. The discal dots and t. p. line are more or less evident. It is common in Texas.

FRUVA OBSOLETA Grote.

Fore wings 12-veined, veins 6 and 7 out of the extremity of the accessory cell, 9 a short furcation. Hind wings with vein 5 weaker, but distinctly present.

The neurulation approaches *Erotyla* more closely than the other species in the presence of the weaker vein 5 on the secondaries, and the shortness of vein 9 on fore wings. The position of 8 and 7 on fore wings is, however, as in *fasciatella*, being separate at base. The species has unicolorous, dusky olive-fuscous primaries, a little paler shaded over costal region at base, and showing a variable ochrey reflection exteriorly. No markings. Illinois and Texas in June.

I have a single specimen of *Fruva acerba* Hy. Edw., from California, which seems allied to *fasciatella*.

XANTHOPTERA NIGROFIMBERIA Guen.

I restricted, Trans. Am. Ent. Soc., 295, 1873, the genus *Xanthoptera* to this type, proposing in the Check List, 1875, *Exyra*, with the type *semicrocea*, for the hairy species with differing venation and which are found to feed in the larval state on the species of *Sarracenia*, or pitcher plants. Guenée's single species of *Exyra* was only known to him through Abbot's drawing.

In *nigrofimbria* the fore wings are 12-veined, the accessory cell longer than in *Spragueia*, veins 7 and 8 separate at base, 9 out of 8 a rather long furcation. Hind wings 8-veined, cell closed, vein 5 hardly weaker than the rest. The palpi are rather long and free from the front with well developed terminal joint, closely scaled. The front is smooth, rather wide and slightly elevated with a shallow depression and discoloured rim. The thorax and head are closely covered with flattened scales. The fore wings are rather broad with produced apices.

XANTHOPTERA SEMIFLAVA Guen.

Fore wings 12-veined, 8 and 7 joined at base, 9 out of 8, a long furcation. Hind wings with vein 5 very faintly indicated. Head and thorax closely scaled. Front globose.

This species differs from the following species of *Exyra* by the closer squamation and the wide, slightly elevated front, in which it agrees with *nigrofimbria*. But there seems to be no rim and shallow depression in the

clypeus. It agrees with *Exyra* also in the union of 8 and 7 at base, but the accessory cell is shorter even than in *nigrofimbria*. On the other hand, vein 9 is longer than in the latter and differs from *Exyra* greatly in this respect. This species has been taken in Texas by Belfrage in April and May. Its generic position may afterwards be changed, but I leave it for the present where it was placed by Gueneé. It is easily known by its lemon yellow thorax and base of primaries, which are outwardly purply black, the line dividing the two colors being *oblique*. It varies slightly in the extent of the darker external portion of the wing.

EXYRA SEMICROCEA Guen.

Fore wings 12-veined, the accessory cell greatly elongated, veins 8 and 7 united at base, 9 a very short furcation. Hind wings with vein 5 nearly as strong as the rest. Front not elevated, rather narrow with a slight inferior tubercle. Squamation of palpi, head and thorax long, thick and hairy or consisting of narrow scales. Fore wings broad with blunted apices. I have not been able to thoroughly examine all the species, but I refer to this genus *semicrocea* Guen., *Ridingsii* Riley, *fax* Grote, and *Rolandiana* Grote. The latter, one of our most brilliant Noctuids, is described in Psyche, II., 38, where also the larva, which feeds on *Sarracenia purpurea*, is described by its discoverer, my friend Mr. Roland Thaxter, after whom the species is named. Mr. Jas. Ridings brought specimens of *semicrocea* and *Ridingsii* from Georgia, but when the material was submitted to me I did not recognize the latter as a distinct species. Mr. Townsend Glover discovered the larva of *semicrocea* feeding on *Sarracenia violaris*, and sent me a drawing of it now many years ago. It has been fully illustrated by Prof. Riley, Trans. St. Louis Academy, Vol. iii.

Prothymia Hüb.

After a careful examination of the type of *P. subolivacea* Harvey, I regard it as a synonym of *P. orgiae*. Three species are described from our territory: *P. coccineifascia* Grote, *P. rosalba* Grote, and *P. orgiae* Grote. This latter is pale yellow with the external margin shaded with rosy. Two faint, obscure, shade lines take the place of the subterminal and t. p. lines; these lines are even, sub-parallel, oblique or slightly curved. Two minute superposed dots take the place of the reniform. In *subolivacea* the tone of the wings is slightly olivaceous and the thorax and base of the wing and internal margin shaded with pale rosy. Otherwise

it does not differ as far as I can see. The species may be known by the discolorous purplish fuscous head and thorax, the dark color extending on the shoulders of the fore wings. It has been collected in Texas by Belfrage in March and July. The primaries are more pointed in *orgiac* and this species is more faintly colored when compared with its congeners.

The species may be thus catalogued :

Erotyla Hübn.

sulphuralis Linn. Europe.

Spragueia Grote.

onagrus Guen., 2, 205. Florida.

Type leo Guen., 2, 205. Alabama.

plumbifimbriata Grote, C. E., ix., 68. Texas.

dama Guen., 2, 205. Alabama, Texas.

guttlata Grote, C. E., vii., 225. Texas.

tortricina Zeller, Beitr., i., 15. Texas.

apicella Grote, Trans. Am. Ent. Soc., iv., 21. Alabama, Texas.

truncatula Zeller, Beitr., i., 3.

Fruva Grote.

Type fasciatella Grote, C. E., vii., 225. Texas.

obsoleta Grote, C. E., ix., 69. Illinois, Texas.

Xanthoptera Guen.

Type nigrofimbria Guen., 2, 241. N. Y., Ala., Texas.

semiflava Guen., 2, 241. Texas.

Exyra Grote.

Type semicrocea Guen., 2, 241. Georgia.

Ridingsii Riley, Trans. St. Louis Acad., iii., 240. Georgia.

nigrocaput Morrison, Proc. Bost. Soc. N. H., 17, 153.

fax Grote, Trans. Am. Ent. Soc., 295. Georgia.

Rolandiana Grote, Psyche, ii., 38. Mass.

Prothymia Hübn.*coccineifascia* Grote, Trans. Am. Ent. Soc., 294. N. Y., Texas.*rosalba* Grote, Trans. Am. Ent. Soc., 295. Penn., Mass.*orgiae* Grote, Trans. Am. Ent. Soc., 116. Texas.*subolivacea* Harv., Bull. B. S. N. S., 3, 11.

DESCRIPTION OF A NEW SPECIES OF PAMPHILA.

BY W. H. EDWARDS, COALBURGH, W. VA.

P. DION.

Male—Expands 1.2 inch.

Upper side has the disk, cell and basal areas pale fulvous, the latter much obscured; costal margin also fulvous, but obscured, and inclining to red in the sub-costal interspaces; the apex and hind margin broadly bordered with fuscous; stigma long, narrow, formed by two velvety-black spots, the lower one a little back of the line of the other; the black arc of cell forms a continuation of stigma and joins a dark stripe which runs along upper side of subcostal to base, the whole forming a sub-triangular inscription such as is seen in *Arpa*. Secondaries have the disk to base obscure fulvous, but there is a clear fulvous ray on the outer part of this area.

Under side of primaries ferruginous, deepest over costal margin; area below cell to inner margin black, and over median interspaces pale black; on the disk an oblique band of four yellow or fulvous spots, besides a fifth spot, obsolescent, out of the line and opposite end of cell. Secondaries ferruginous, of uniform tint, except that there are two pale rays from base, one of which passes through cell, the other occupies submedian interspace, to margin.

Female—Expands 1.5 inch.

Upper side fuscous with a slight tint of fulvous; primaries have two yellow sub-apical spots, and an oblique row of yellow spots across the disk; secondaries have the disk nearly as in male, more obscured, but with the bright ray. Under side as in the male.

This species is closely allied to *Arpa* Bd. and Lec., but may be distinguished from it by the pale rays on disk of secondaries, *Arpa* being one shade of color. I formerly received *Dion* from Mr. G. M. Dodge,

Nebraska, and supposed it to be *Arpa*, and so gave Nebraska as one of the localities in my Catalogue. This season I have received the species from the southern shore of Lake Michigan, in Indiana, from Mr. Chas. E. Worthington; also from Mr. J. A. Moffat, of Hamilton, Ont., who says it inhabits one locality there. It would appear then to occupy a belt extending from Canada to Nebraska.

CORRESPONDENCE.

DEAR SIR,—

Mr. A. H. Mundt, of Fairburg, Ills., writes me thus: "On 7th Sept., while walking through a grove near this place, I saw a large number of *D. Archippus* hovering about and settling upon some limbs of a hickory. More from curiosity than anything else, I went again the next day before sunset, and found the butterflies in still larger numbers on two branches of the tree. (The weather had been pretty cold for several days, with slight frost at night.) Those sitting within reach of my net seemed to be alarmed and would fly upon approach, but would alight again. I resolved to make a further test, and after dark I started for the grove with a long step-ladder, a lantern and box, and took 125 specimens, 51 ♂, 74 ♀, all of them perfect." If such assemblages of these butterflies are usual, they have so far escaped notice, and the object of them is matter for conjecture.

W. H. EDWARDS.

Coalburgh, W. Va., Oct. 20, 1879.

DEAR SIR,—

In the June number of the CAN. ENT., W. E. Saunders remarks that he saw a specimen of *Papilio thoas* on the 11th May, and that "the appearance of this butterfly at so early a date would seem to indicate that they are double-brooded here, unless it can be shown that the escape of the imago from some of the chrysalids is much earlier than from others." I have obtained two fine specimens of this butterfly from mature larvæ; one in 1878, the other this year. The first example went into chrysalis about the middle of September, and the imago appeared on the 9th of May following. The second was in chrysalis only from the 7th September to the 23rd of March. I think the temperature at which the chrysalids

were kept was about equal. On the first day of July this year I took two specimens of *thoas* in King's Co., N. B., and I have seen them on the wing in St. John Co., a few miles from the city, at the same date in other years. I have one example captured here a few days later.

CAROLINE E. HEUSTIS, St. John, N. B.

DEAR SIR,—

I have got caterpillars of *P. thoas* or *cresphontes* taken in the garden of A. Reid, in the west end of the city, feeding on a bush called the "burning bush," from its going off with a blaze when light is held to it; I do not know its Botanical name. Two of them have gone into chrysalis.

J. ALSTON MOFFAT, Hamilton, Ont.

[The plant referred to is *Dictamnus fraxinella*.—ED. C. E.]

DEAR SIR,—

On p. 195 of the present volume, the CAN. ENTOM. makes me say that I regard *Disippus* as "probably the original type" of *Basilarchia*. I have never held such an opinion, but the very opposite.

SAML. H. SCUDDER.

Cambridge, Mass., Dec. 1, 1879.

PAPILIO CRESPHONTES.—Mr. Wm. Murray, of Hamilton, writes as follows: "We have a new butterfly in Hamilton and vicinity, and several of them have been captured; it is *P. cresphontes* (*thoas*). I got two of the larvæ this fall feeding on *Dictamnus fraxinella rubra*; one has gone into chrysalis, and the other died after it had hung up to undergo its change."

On the 16th of October, Mr. Watson, of Thedford, Ont., brought us a specimen of this larva, which had been found feeding on Prickly Ash, *Xanthoxylum fraxineum*. It was nearly full grown, and we fed it on Prickly Ash and Orange leaves until it spun up. In the endeavor to shed its larva skin it died when the chrysalis was more than half developed; the same fatality attended a specimen which we tried to rear last year.—ED. C. E.

ERRATA, VOL. XI.—P. 13, l. 16, for "2 ♂" read *a*, ♂; p. 15, l. 11, for "ii." read *i*.; p. 214, l. 9, for "oscillated" read ocellated; on p. 206, l. 20, 22 and 26, one *s* should be deled from *Morrissonia*.

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